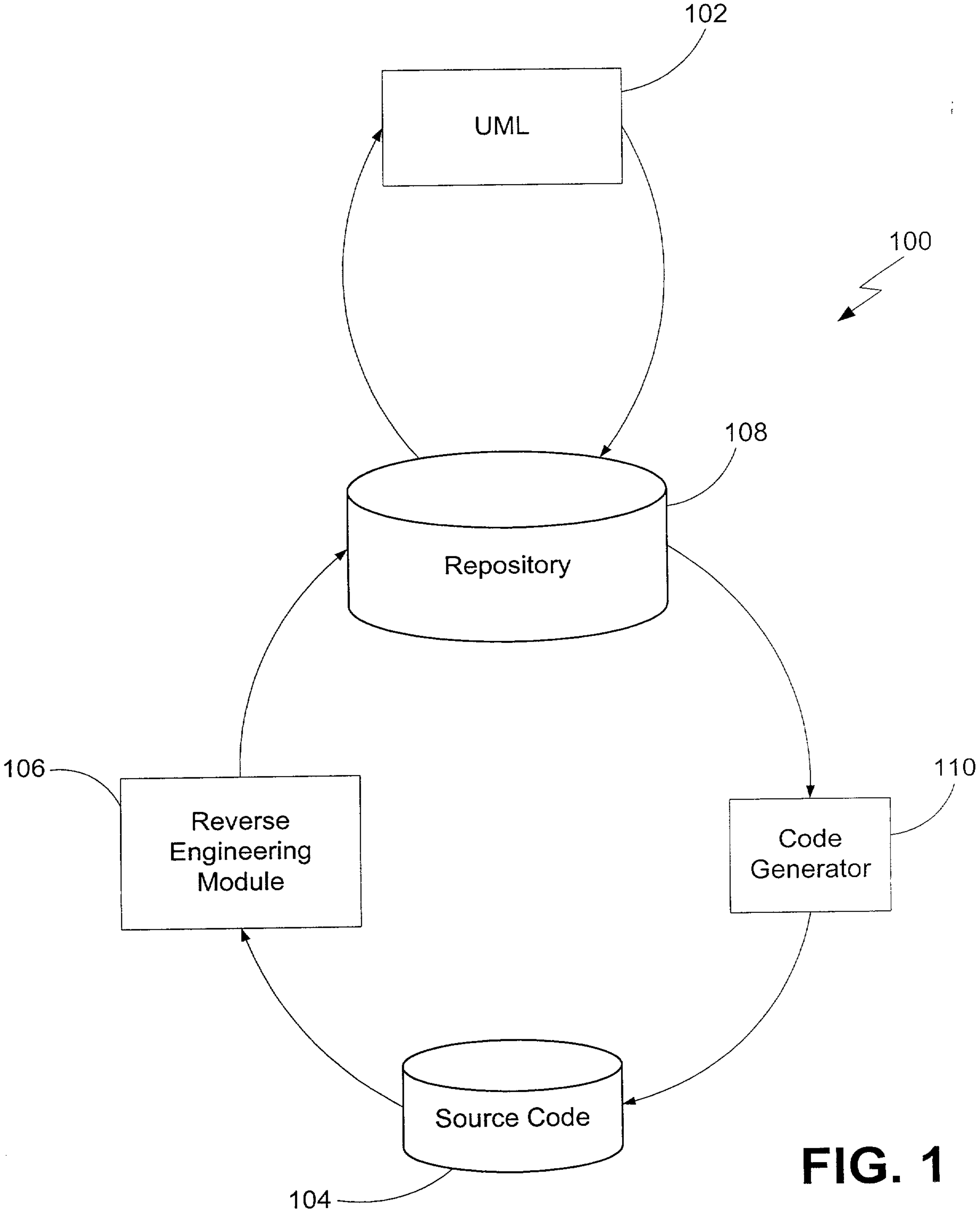

102
UML
100
108
Repository
106
Reverse Engineering Module
110
Code Generator
Source Code
104

FIG. 1
(Prior Art)

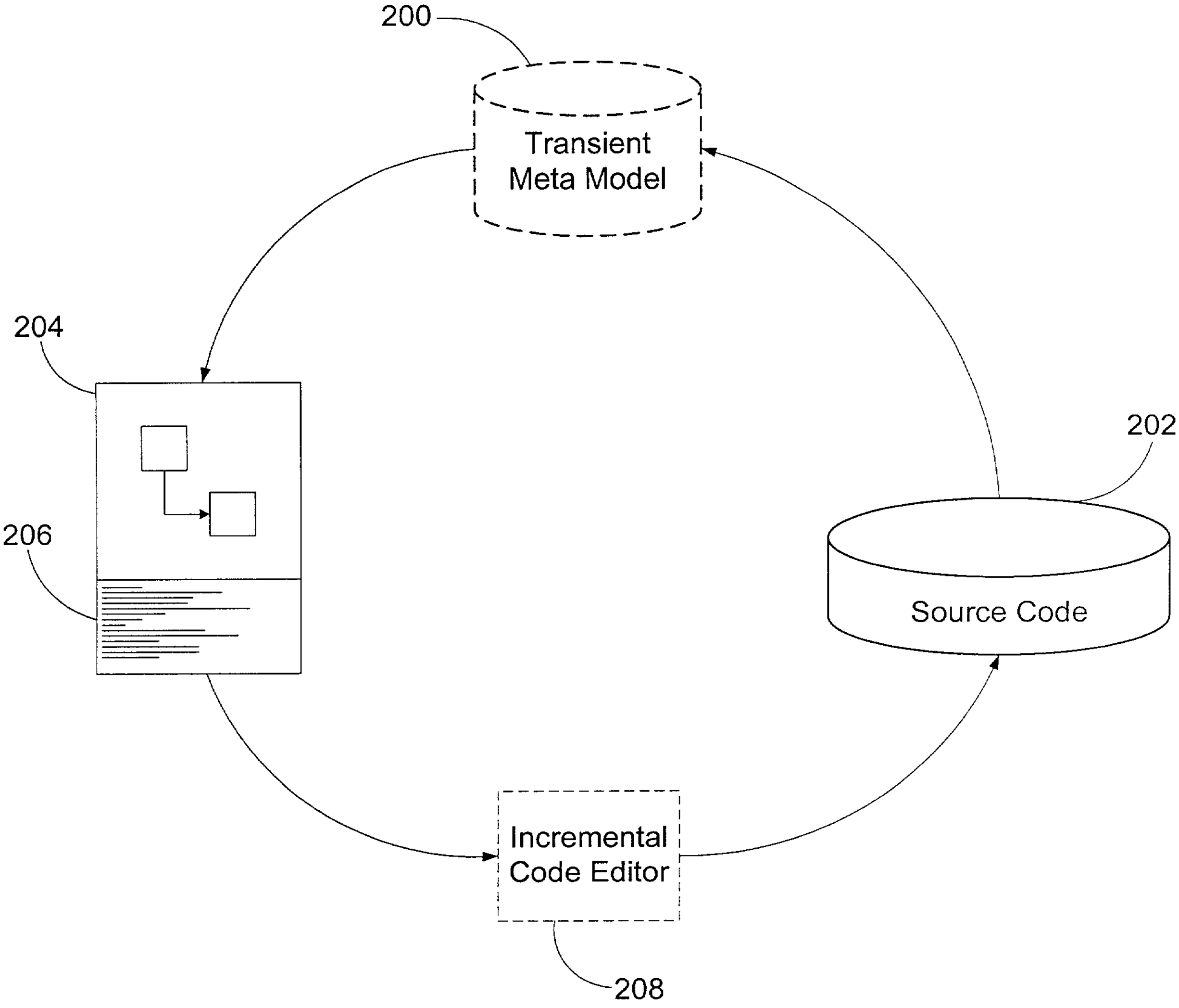

200
Transient
Meta Model
204
206
202
Source Code
Incremental
Code Editor
208

FIG. 2

09839646 .042001

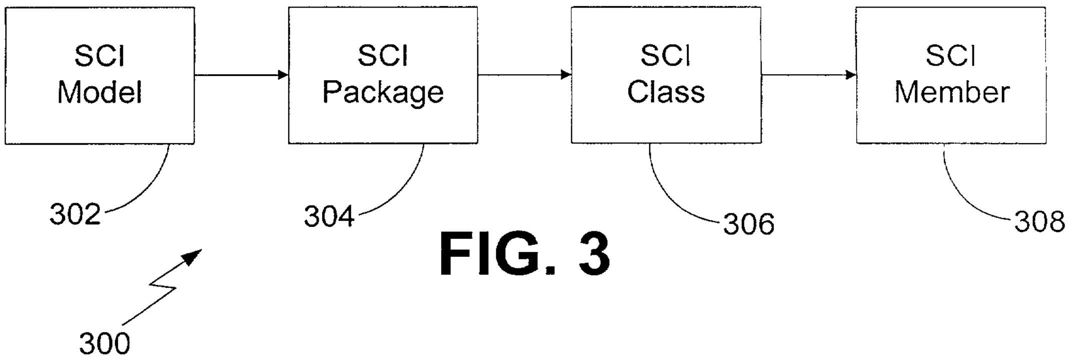
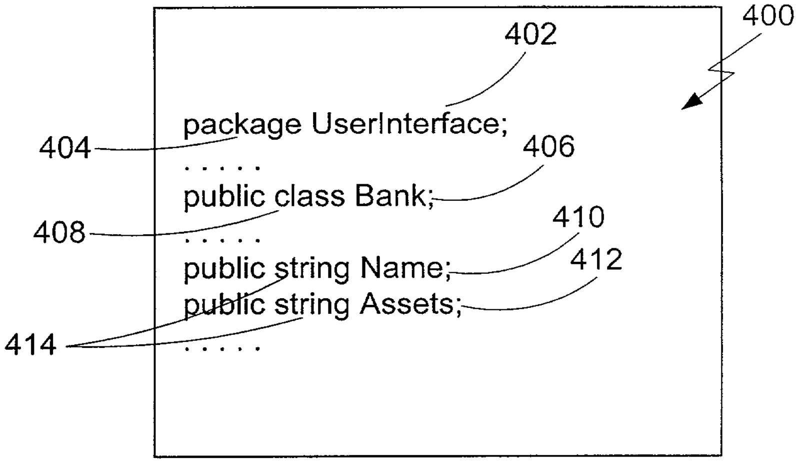

SCI Model
SCI Package
SCI Class
SCI Member
302
304
306
308
300

FIG. 3


400
402
404
406
408
410
412
414

```
package UserInterface;
. . . . .
public class Bank;
. . . . .
public string Name;
public string Assets;
. . . . .
```

FIG. 4

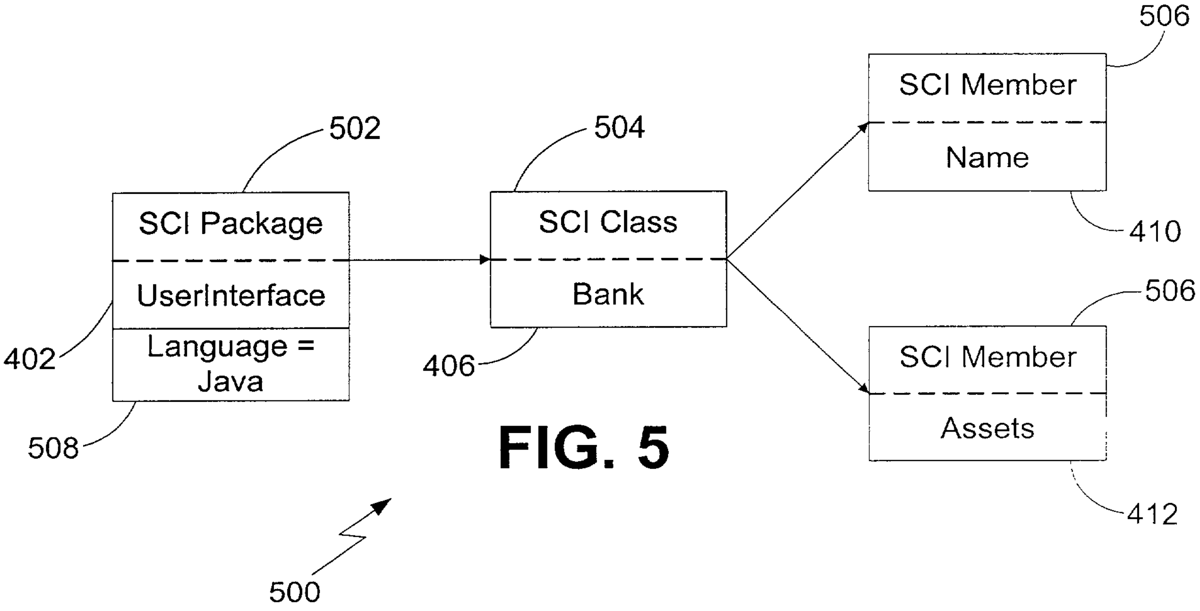

506
502
504
SCI Member
Name
SCI Package
UserInterface
Language =
Java
SCI Class
Bank
410
506
SCI Member
Assets
402
406
508
412
500

FIG. 5

09836545.042601

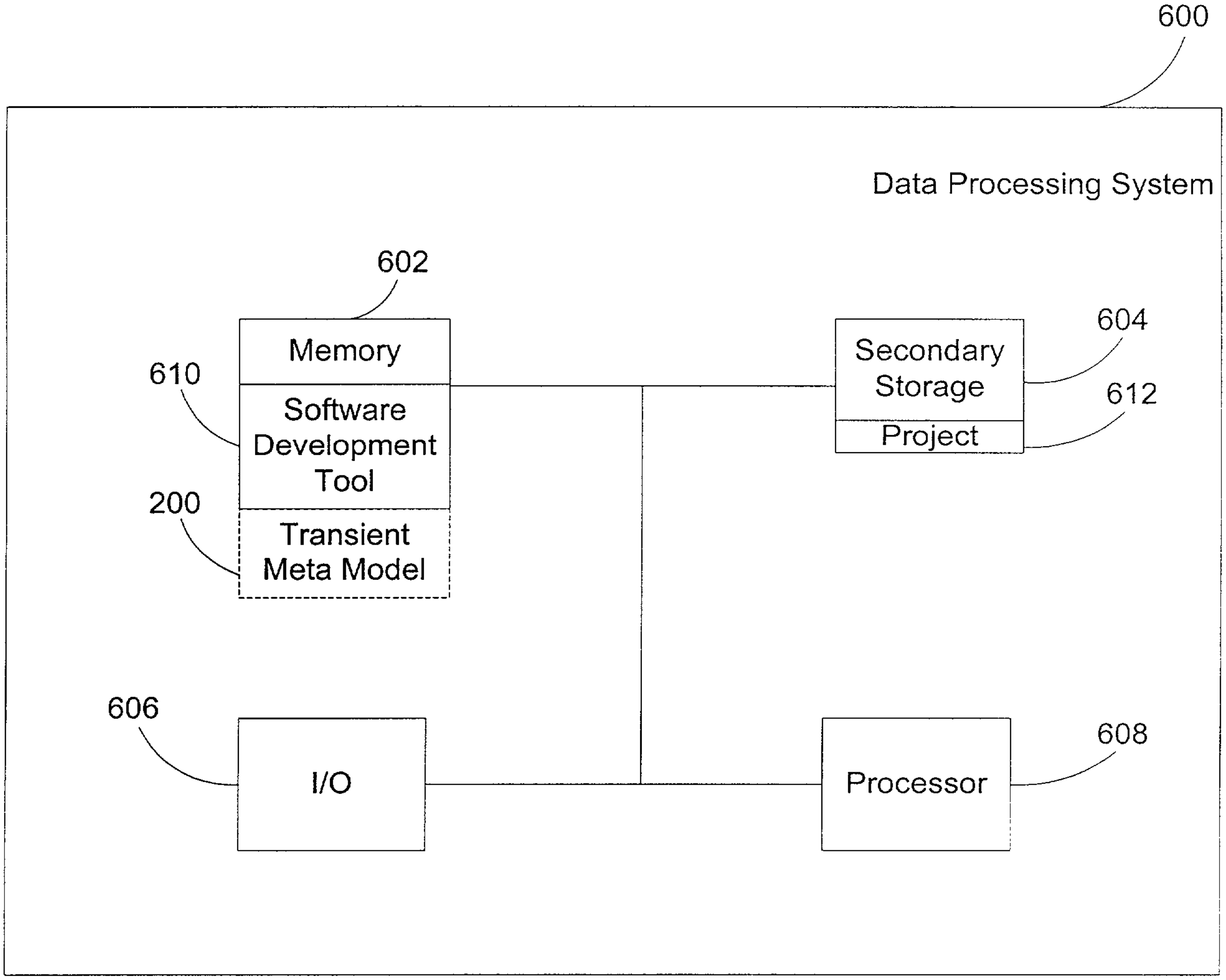

600
Data Processing System
602
Memory
610
Software Development Tool
200
Transient Meta Model
604
Secondary Storage
612
Project
606
I/O
608
Processor

FIG. 6

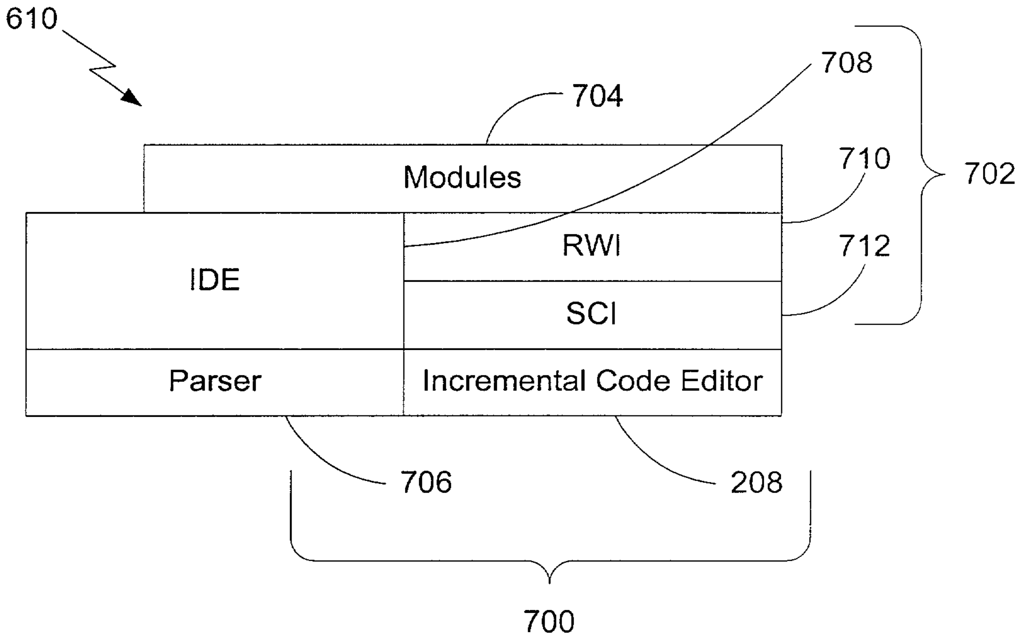
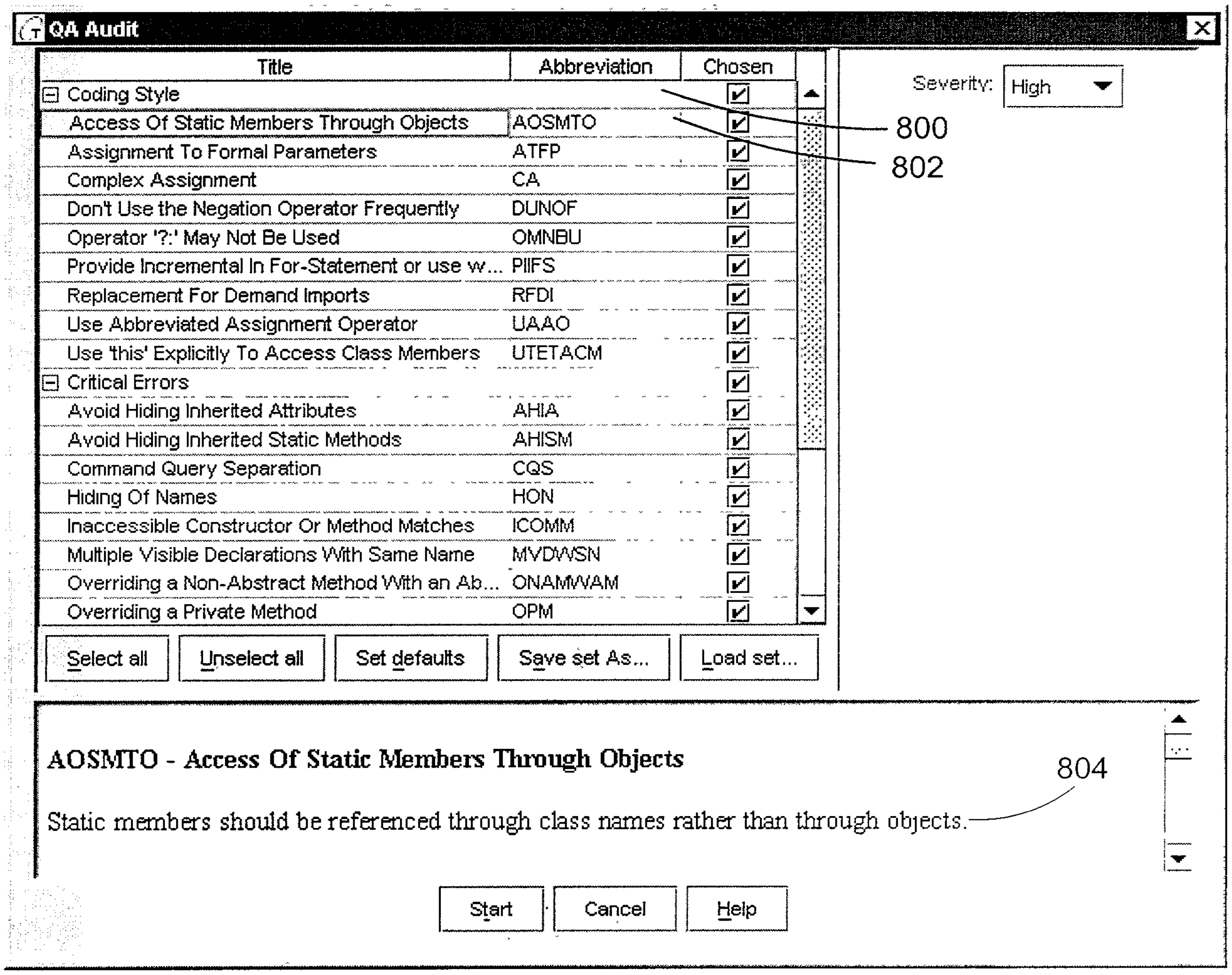

Modules
IDE
RWI
SCI
Parser
Incremental Code Editor

FIG. 7



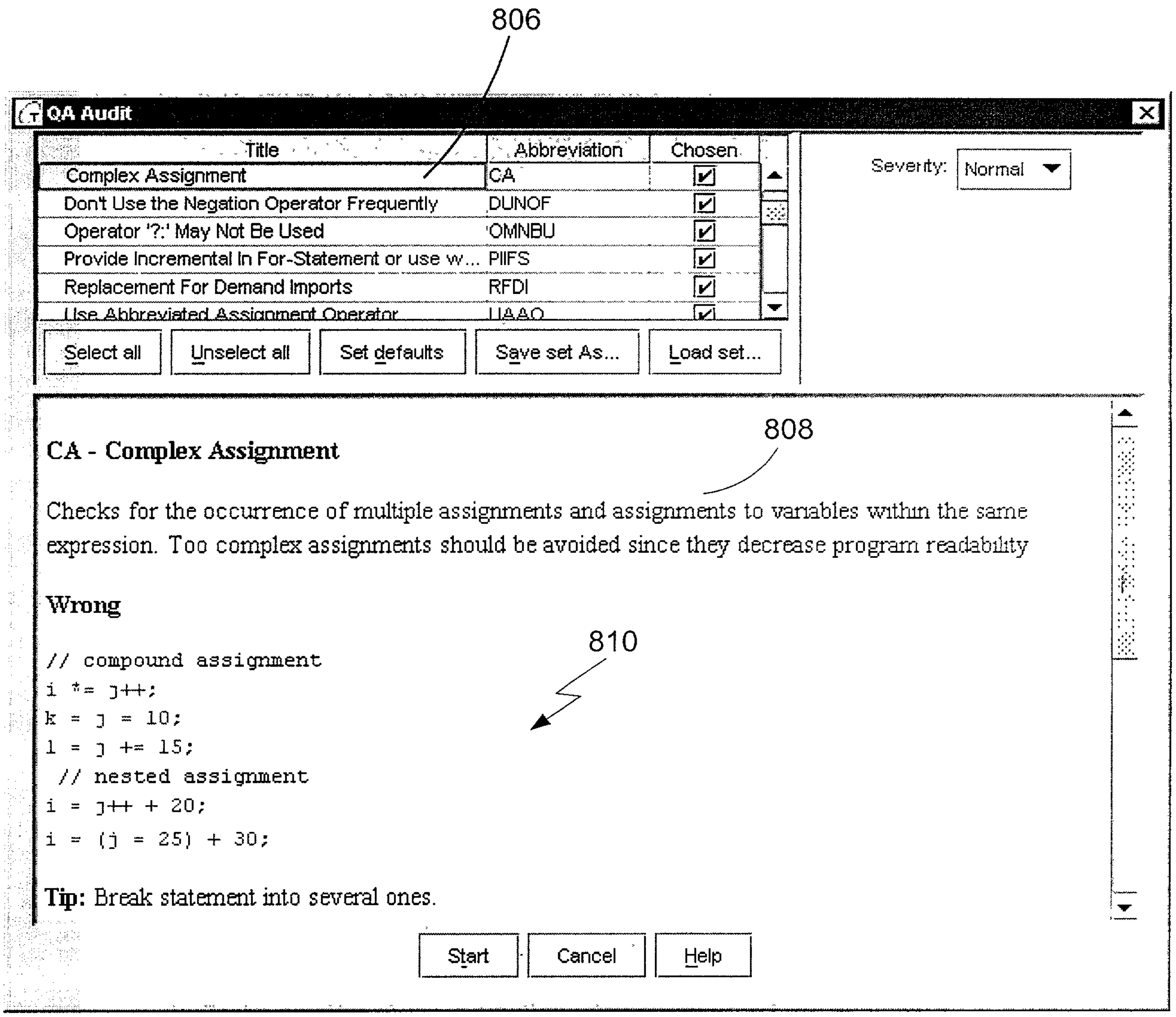
Severity: High

Title	Abbreviation	Chosen
⊟ Coding Style		☑
Access Of Static Members Through Objects	AOSMTO	☑
Assignment To Formal Parameters	ATFP	☑
Complex Assignment	CA	☑
Don't Use the Negation Operator Frequently	DUNOF	☑
Operator '?:' May Not Be Used	OMNBU	☑
Provide Incremental In For-Statement or use w...	PIIFS	☑
Replacement For Demand Imports	RFDI	☑
Use Abbreviated Assignment Operator	UAAO	☑
Use 'this' Explicitly To Access Class Members	UTETACM	☑
⊟ Critical Errors		☑
Avoid Hiding Inherited Attributes	AHIA	☑
Avoid Hiding Inherited Static Methods	AHISM	☑
Command Query Separation	CQS	☑
Hiding Of Names	HON	☑
Inaccessible Constructor Or Method Matches	ICOMM	☑
Multiple Visible Declarations With Same Name	MVDWSN	☑
Overriding a Non-Abstract Method With an Ab...	ONAMWAM	☑
Overriding a Private Method	OPM	☑

AOSMTO - Access Of Static Members Through Objects

Static members should be referenced through class names rather than through objects.

FIG. 8A


806
808
810
QA Audit
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
Start
Cancel
Help

Title	Abbreviation	Chosen
Complex Assignment	CA	☑
Don't Use the Negation Operator Frequently	DUNOF	☑
Operator '?:' May Not Be Used	'OMNBU	☑
Provide Incremental In For-Statement or use w...	PIIFS	☑
Replacement For Demand Imports	RFDI	☑
Use Abbreviated Assignment Operator	UAAO	☑

Severity: Normal

CA - Complex Assignment

Checks for the occurrence of multiple assignments and assignments to variables within the same expression. Too complex assignments should be avoided since they decrease program readability

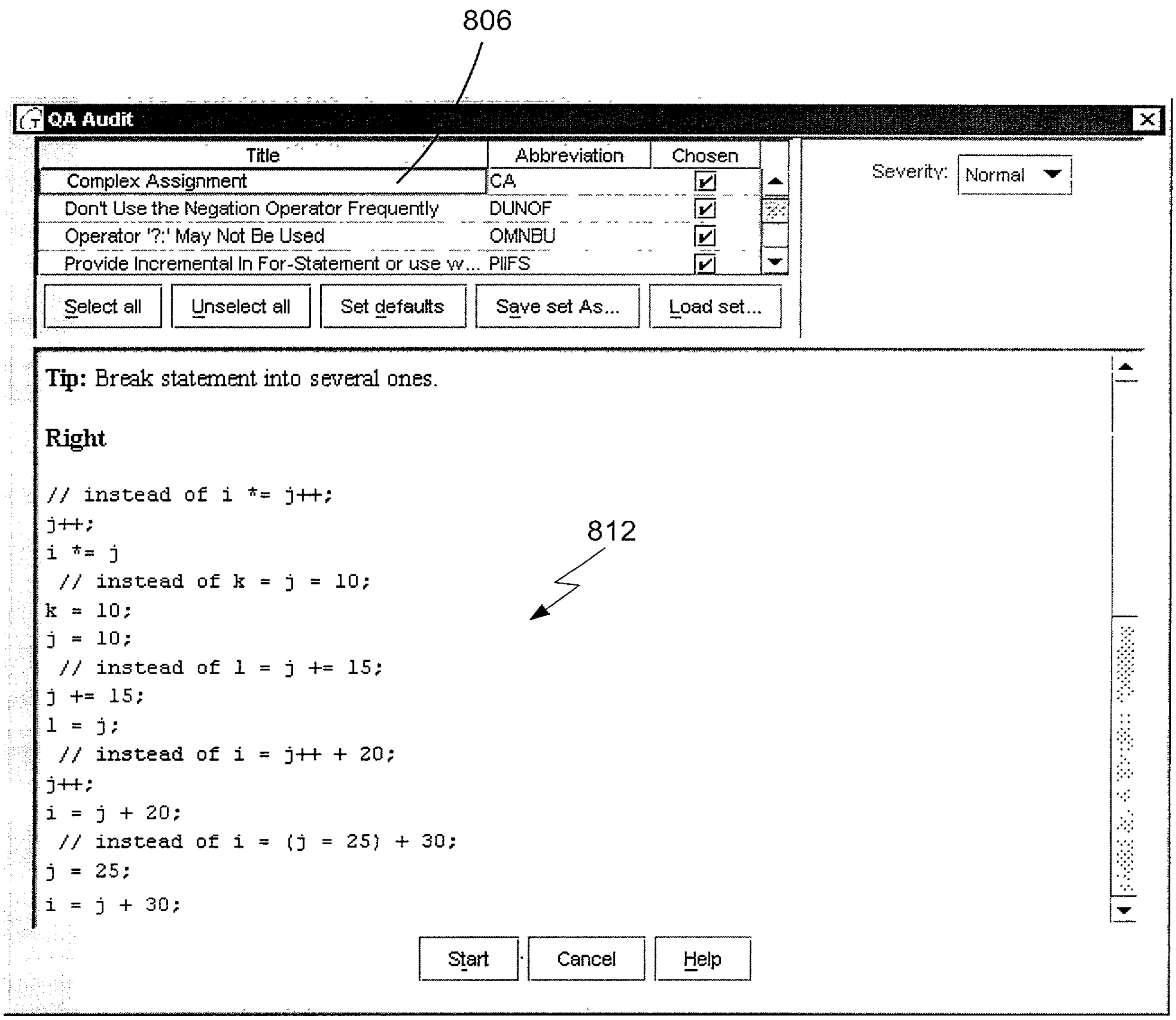
Wrong

```
// compound assignment
i *= j++;
k = j = 10;
l = j += 15;
 // nested assignment
i = j++ + 20;
i = (j = 25) + 30;
```

Tip: Break statement into several ones.

FIG. 8B

09839646.042001


806
812
QA Audit
Severity: Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
Start
Cancel
Help

Title	Abbreviation	Chosen
Complex Assignment	CA	☑
Don't Use the Negation Operator Frequently	DUNOF	☑
Operator '?:' May Not Be Used	OMNBU	☑
Provide Incremental In For-Statement or use w...	PIIFS	☑

Tip: Break statement into several ones.

Right

```
// instead of i *= j++;
j++;
i *= j
 // instead of k = j = 10;
k = 10;
j = 10;
 // instead of l = j += 15;
j += 15;
l = j;
 // instead of i = j++ + 20;
j++;
i = j + 20;
 // instead of i = (j = 25) + 30;
j = 25;
i = j + 30;
```

FIG. 8C

10024045 . 052602

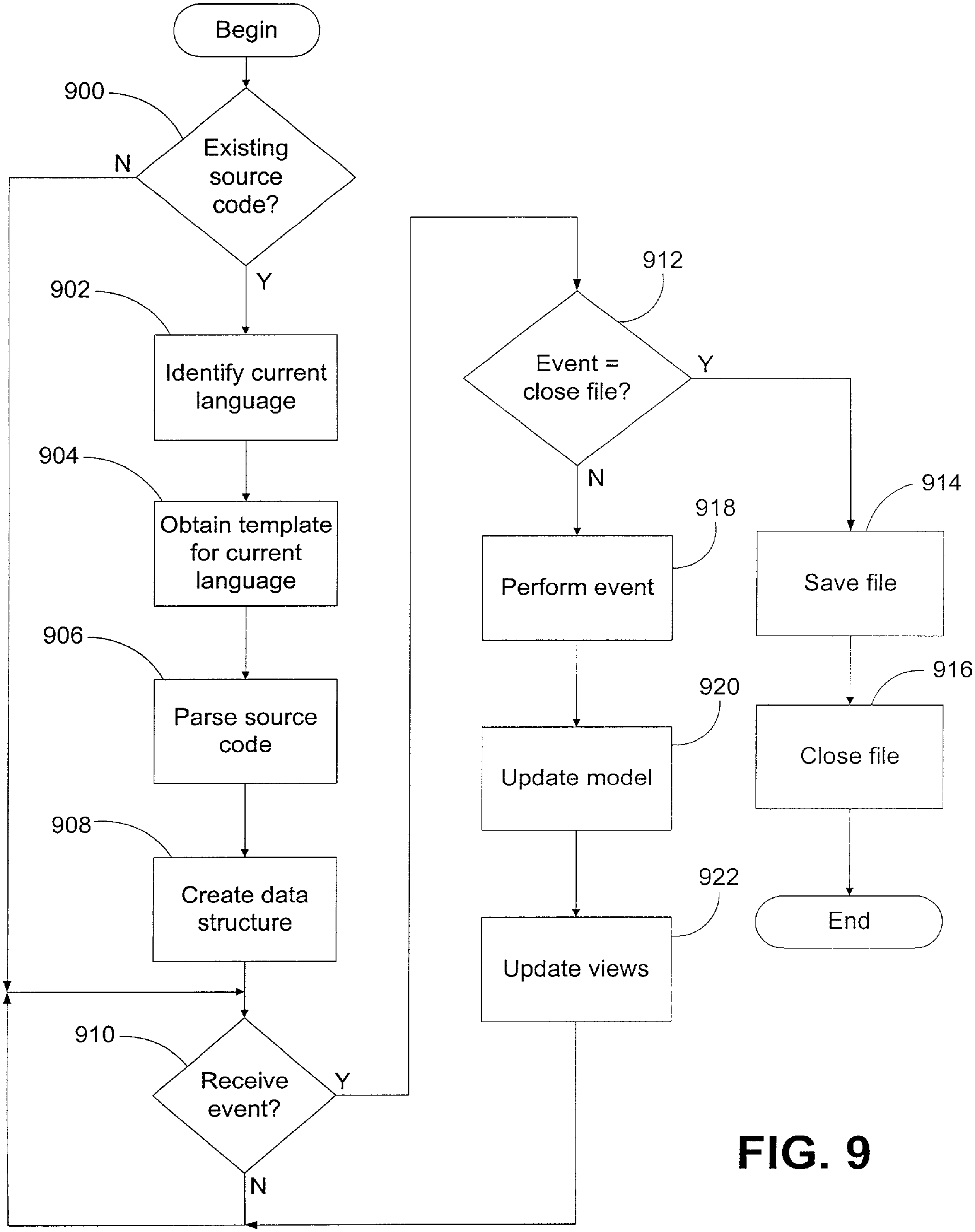

Begin
900
Existing source code?
N
Y
902
Identify current language
904
Obtain template for current language
906
Parse source code
908
Create data structure
910
Receive event?
Y
N
912
Event = close file?
Y
N
918
Perform event
920
Update model
922
Update views
914
Save file
916
Close file
End

FIG. 9

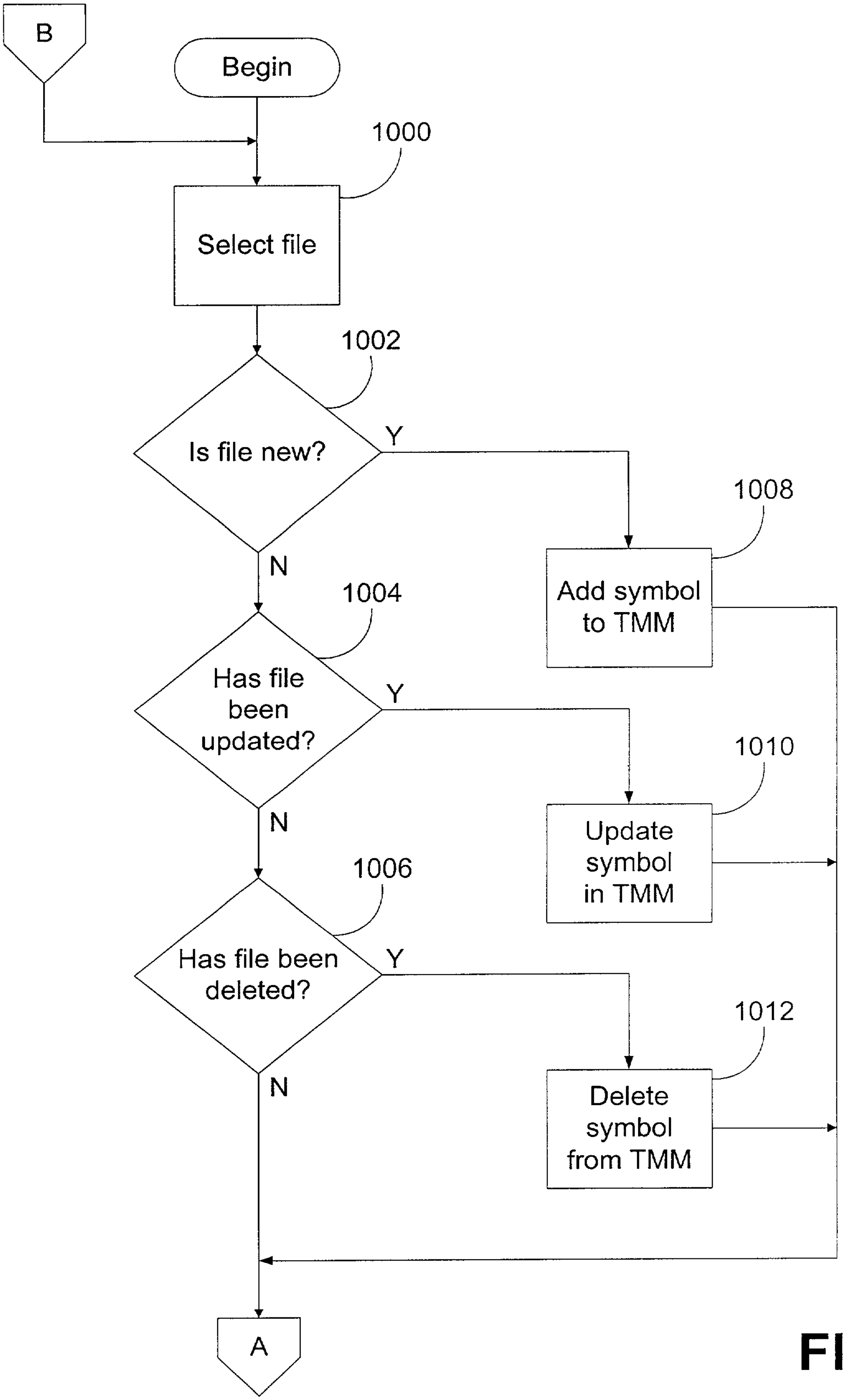

B
Begin
1000
Select file
1002
Is file new?
Y
N
1008
Add symbol to TMM
1004
Has file been updated?
Y
N
1010
Update symbol in TMM
1006
Has file been deleted?
Y
N
1012
Delete symbol from TMM
A

FIG. 10A

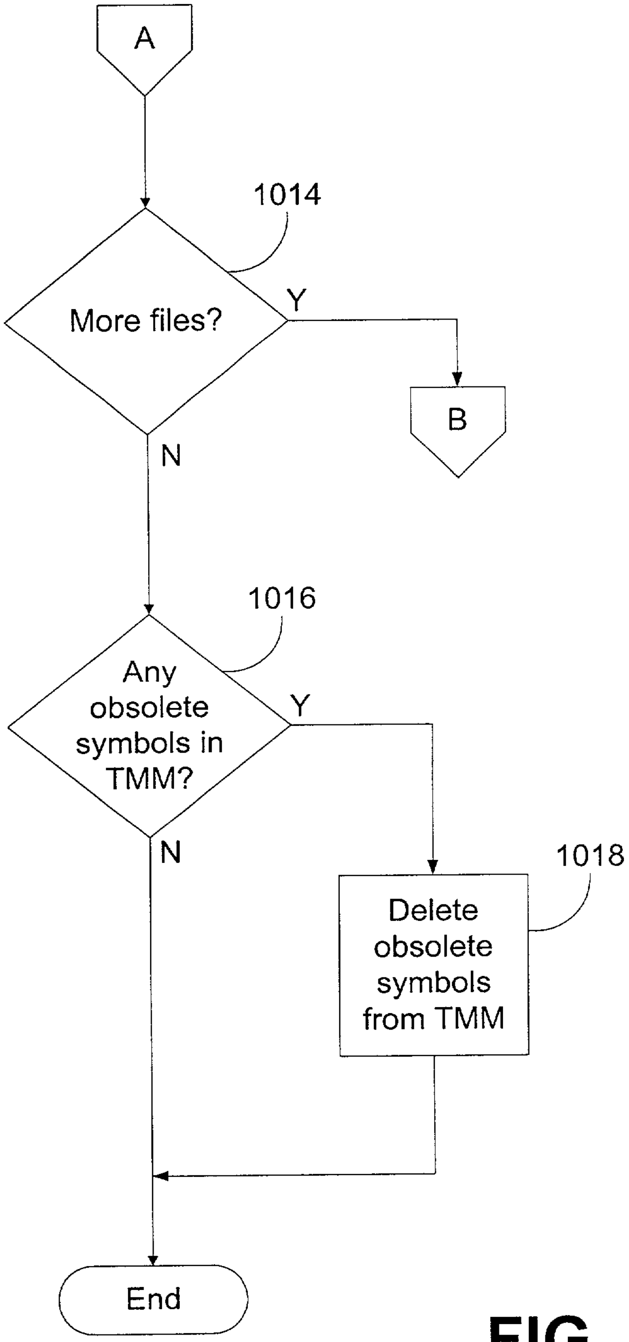

A
1014
More files?
Y
B
N
1016
Any obsolete symbols in TMM?
Y
N
1018
Delete obsolete symbols from TMM
End

FIG. 10B

10024050 . 042302

09825745 .042001

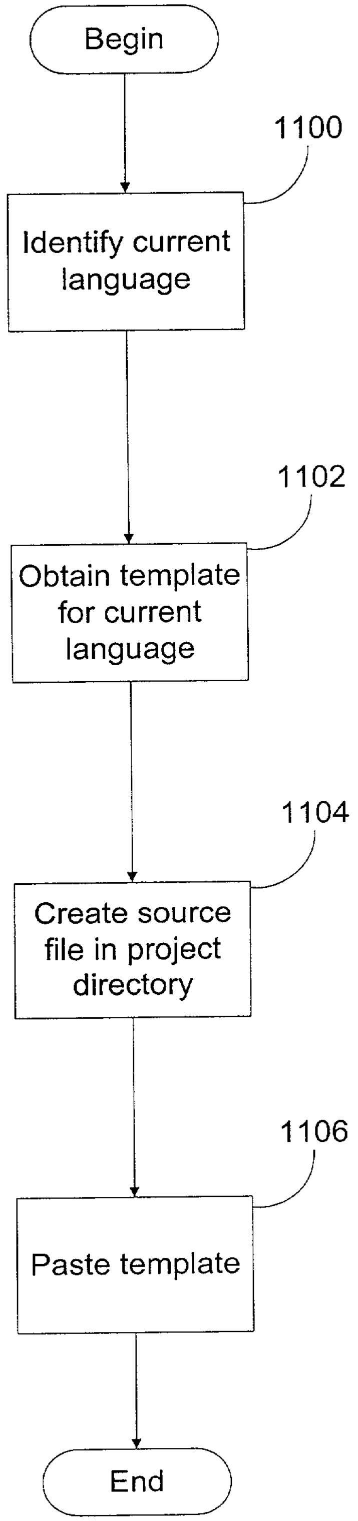

Begin
1100
Identify current language
1102
Obtain template for current language
1104
Create source file in project directory
1106
Paste template
End

FIG. 11

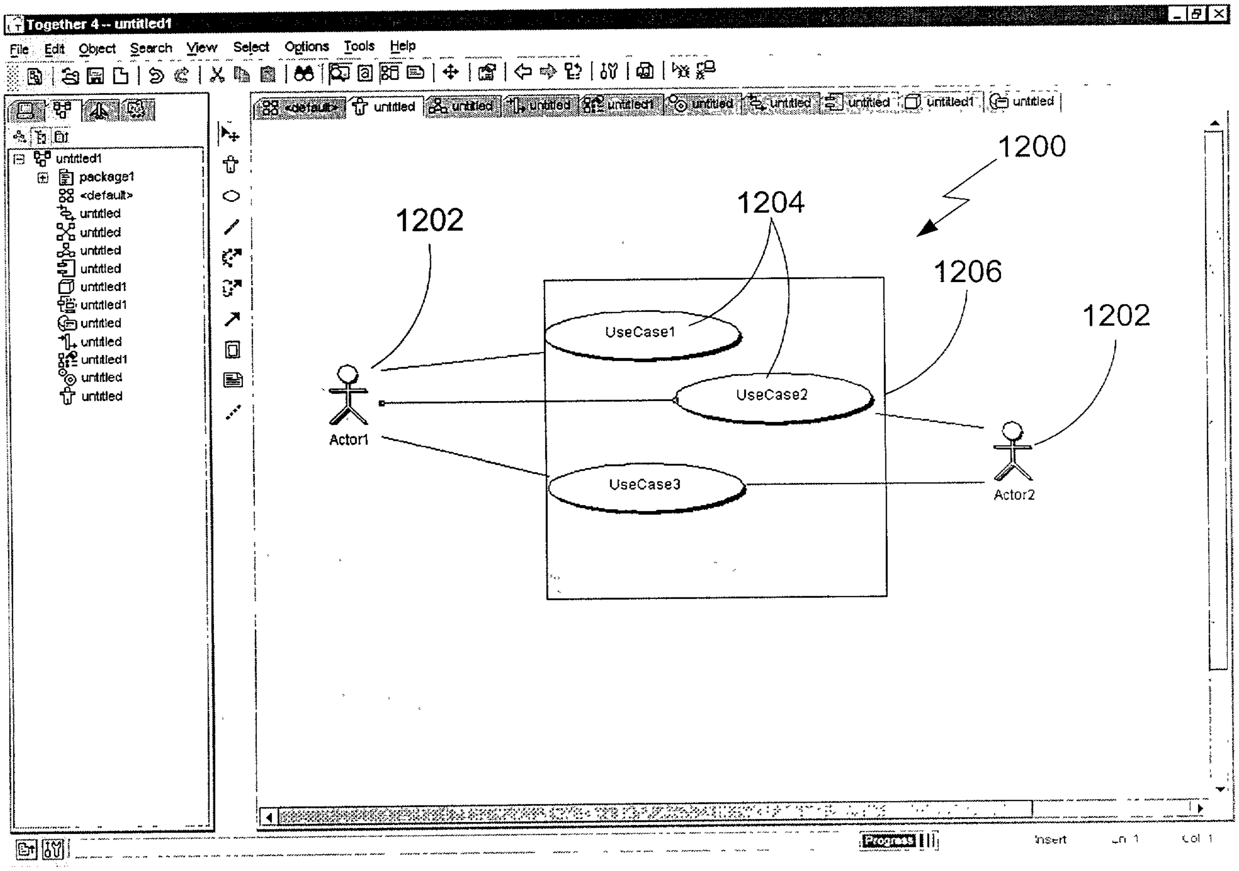
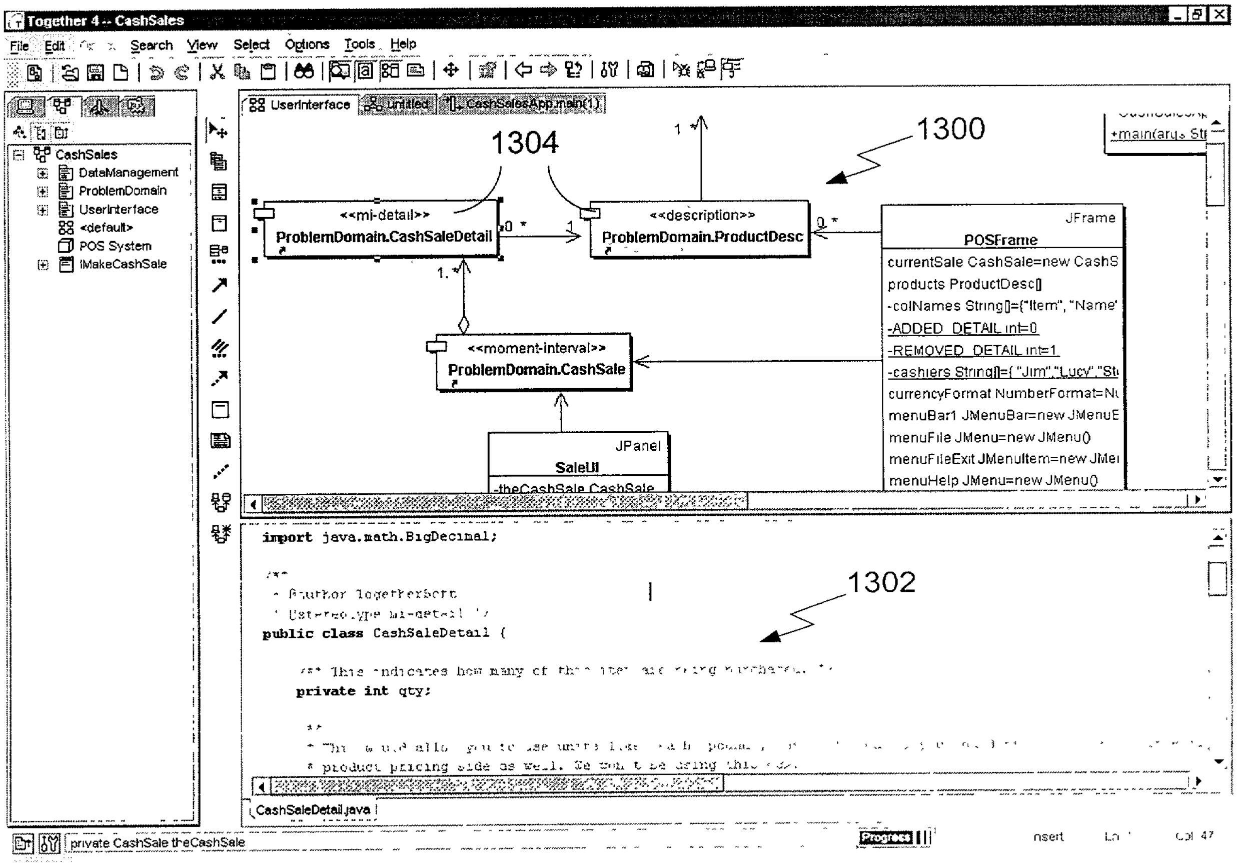

Together 4 -- untitled1
File
Edit
Object
Search
View
Select
Options
Tools
Help
<default>
untitled
untitled
untitled
untitled1
untitled
untitled
untitled
untitled1
untitled
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
1200
1202
1204
1206
1202
UseCase1
UseCase2
UseCase3
Actor1
Actor2
Progress
Insert
Ln 1
Col 1

FIG. 12


Together 4 -- CashSales
File
Edit
Search
View
Select
Options
Tools
Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
IMakeCashSale
UserInterface
untitled
CashSalesApp.main(1)
1300
1304
1
<<mi-detail>>
ProblemDomain.CashSaleDetail
0..*
1
<<description>>
ProblemDomain.ProductDesc
0..*
1..*
<<moment-interval>>
ProblemDomain.CashSale
JFrame
POSFrame
JPanel
SaleUI
-theCashSale CashSale
+main(args Str
1302
CashSaleDetail.java
private CashSale theCashSale
Progress
nsert
Ln
Col 47

currentSale CashSale=new CashS
products ProductDesc[]
-colNames String[]={"Item", "Name"
-ADDED_DETAIL int=0
-REMOVED_DETAIL int=1
-cashiers String[]={"Jim","Lucy","St
currencyFormat NumberFormat=Nu
menuBar1 JMenuBar=new JMenuE
menuFile JMenu=new JMenu()
menuFileExit JMenuItem=new JMe
menuHelp JMenu=new JMenu()

```
import java.math.BigDecimal;

/**
 * @author TogetherSoft
 * @stereotype mi-detail */
public class CashSaleDetail {

    /** This indicates how many of this item are being purchased. */
    private int qty;

     /**
     * This would allow you to use units like each, pounds, [illegible]
     * product pricing side as well. We won't be using this now.
```

FIG. 13

10024065 . 052902

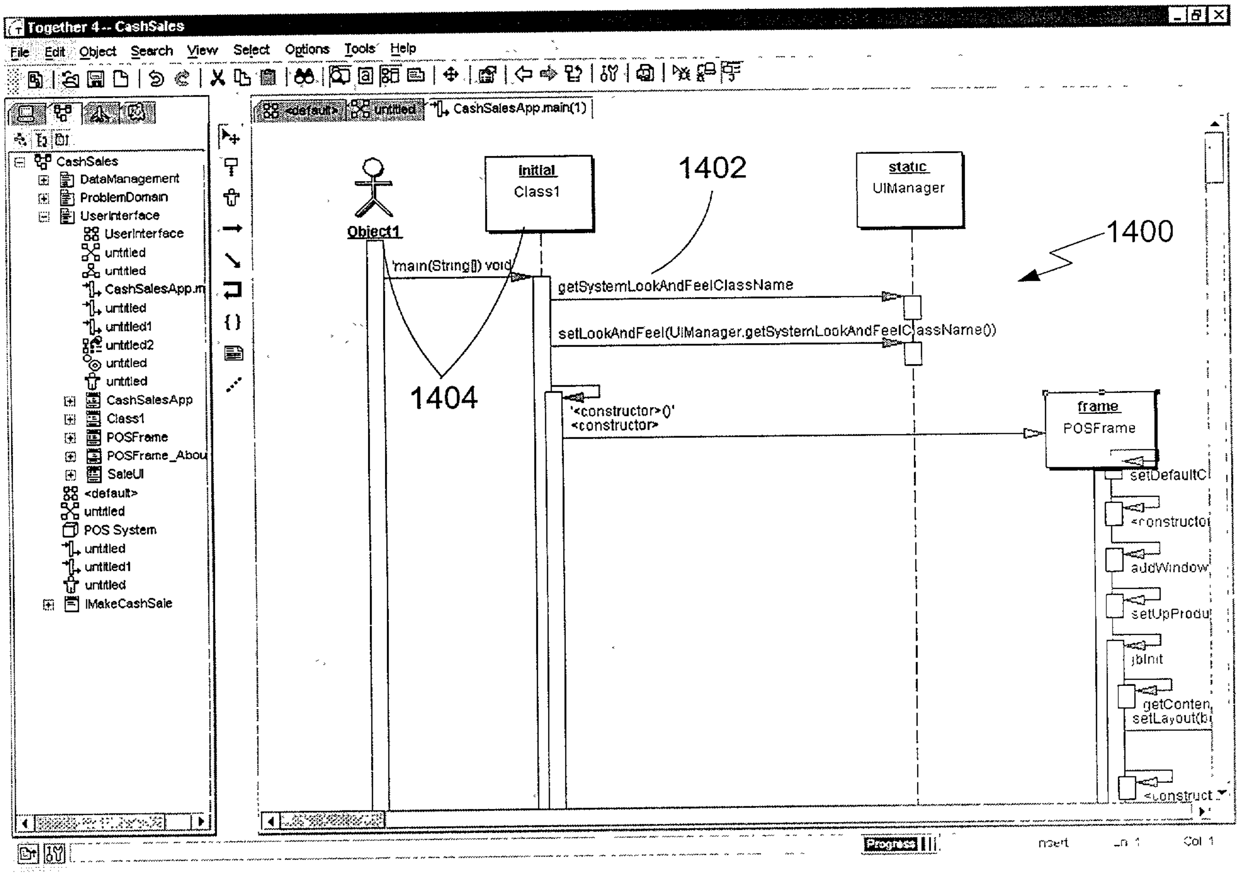

Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp.m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp.main(1)
Object1
initial
Class1
static
UIManager
frame
POSFrame
'main(String[]) void
getSystemLookAndFeelClassName
setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
'<constructor>()'
<constructor>
setDefaultC
<constructo
addWindow
setUpProdu
jbInit
getConten
setLayout(b
<construct
Progress
Insert
Ln 1
Col 1
1400
1402
1404

FIG. 14

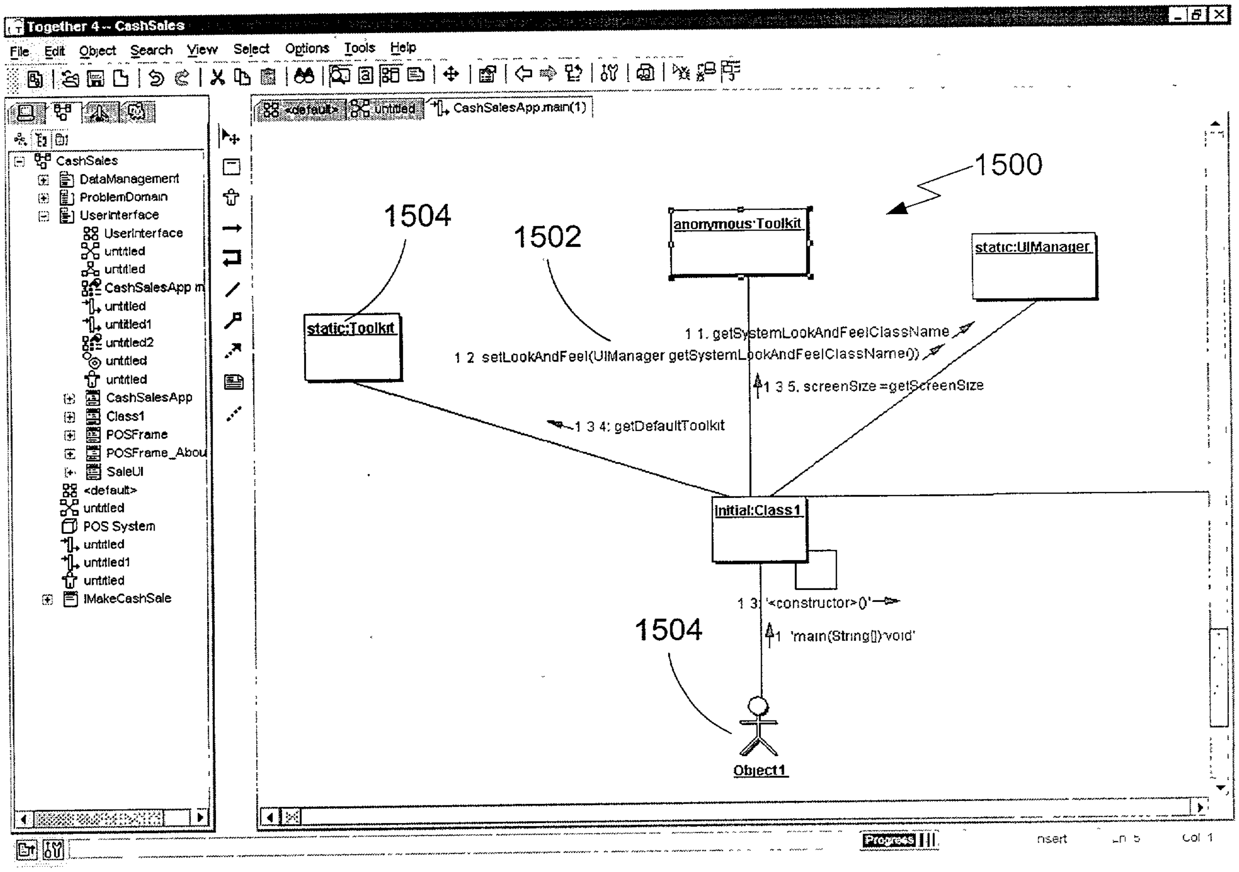

Together 4 -- CashSales
File
Edit
Object
Search
View
Select
Options
Tools
Help
<default>
untitled
CashSalesApp.main(1)
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
1500
1504
1502
anonymous:Toolkit
static:UIManager
static:Toolkit
1.1. getSystemLookAndFeelClassName
1.2. setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1.3.5. screenSize =getScreenSize
1.3.4: getDefaultToolkit
initial:Class1
1.3: '<constructor>()'
1504
1: 'main(String[])void'
Object1
Progress
Insert
Ln 5
Col 1

FIG. 15

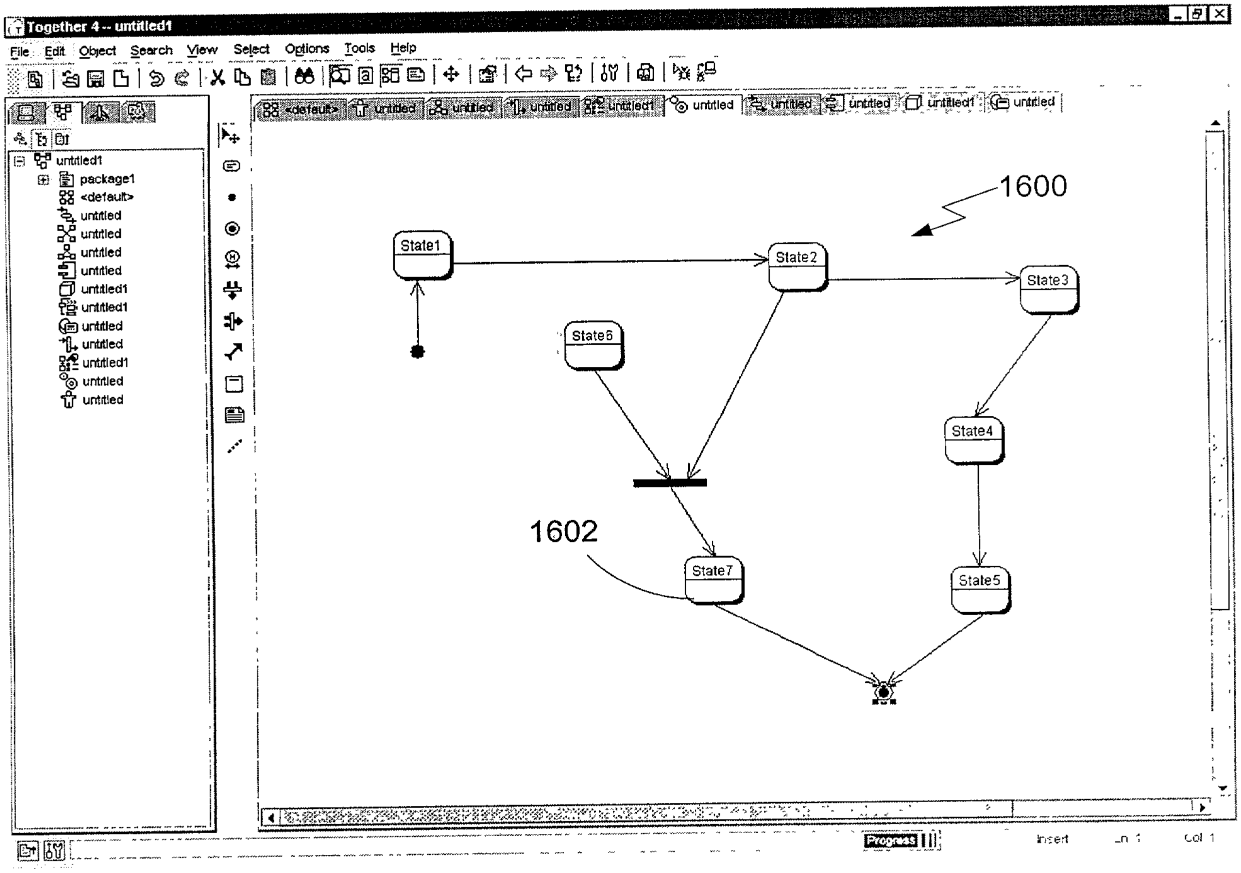

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
<default>
untitled
untitled
untitled
untitled1
untitled
untitled
untitled
untitled1
untitled
1600
State1
State2
State3
State6
State4
1602
State7
State5
Progress
Insert
Ln 1
Col 1

FIG. 16

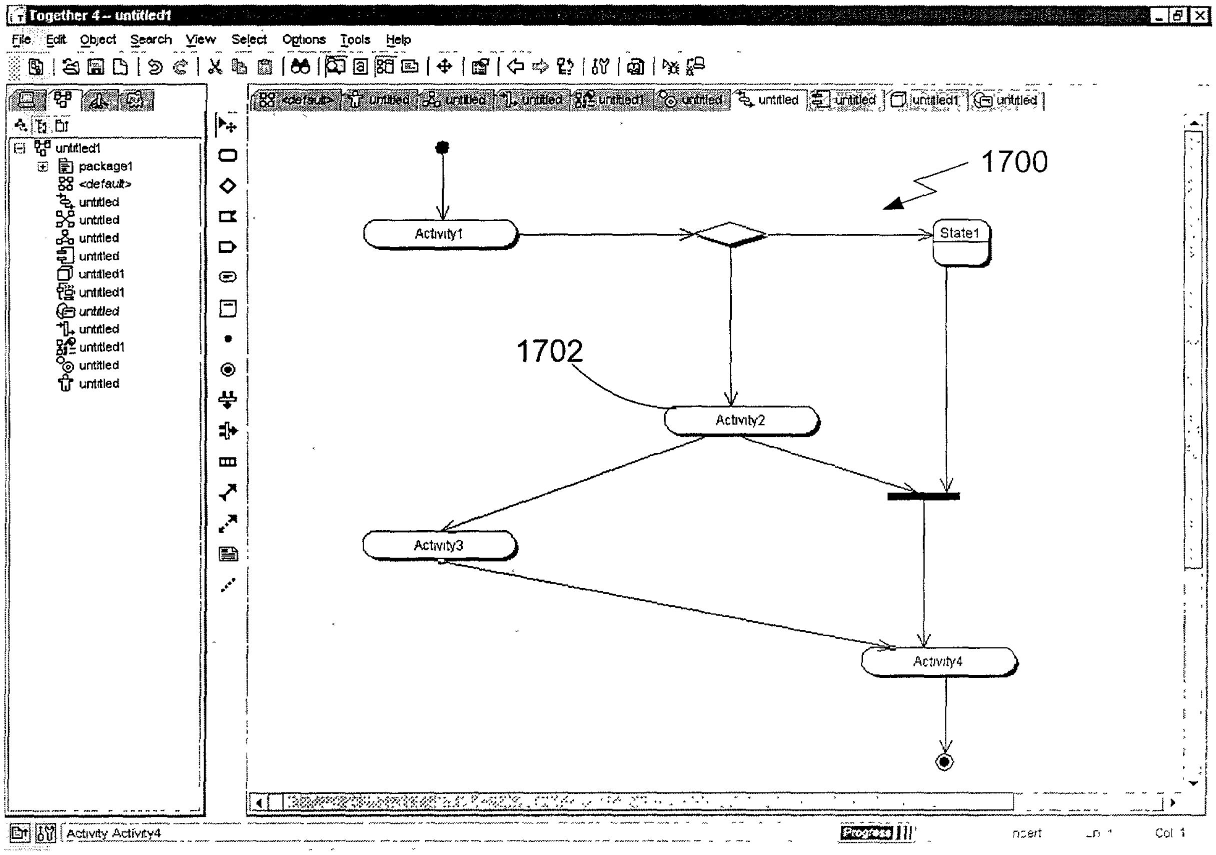

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
<default> untitled untitled untitled untitled1 untitled untitled untitled untitled1 untitled
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
1700
Activity1
State1
1702
Activity2
Activity3
Activity4
Activity Activity4
Progress
Insert
Col 1

FIG. 17

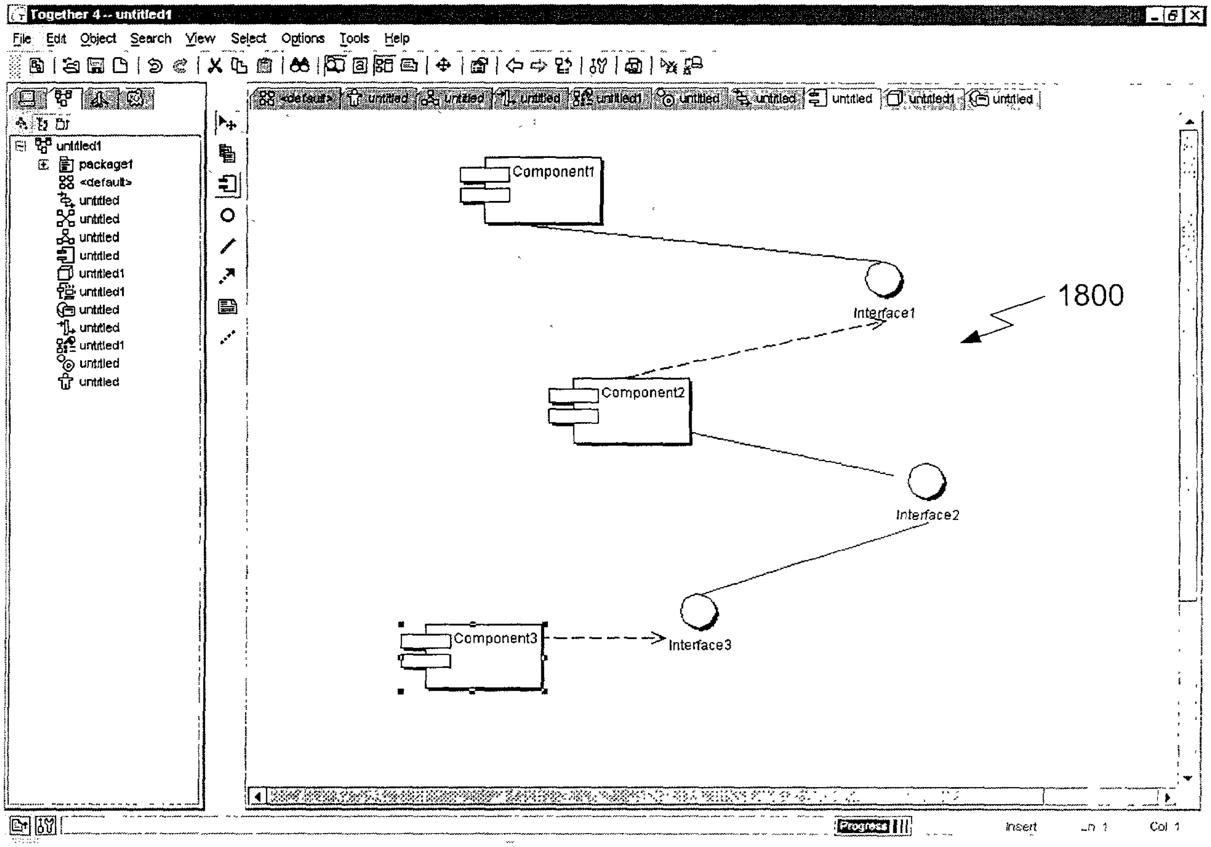

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
<default>
untitled
untitled
untitled
untitled1
untitled
untitled
untitled
untitled1
untitled
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
Component1
Interface1
1800
Component2
Interface2
Component3
Interface3
Progress
Insert
Ln 1
Col 1

FIG. 18

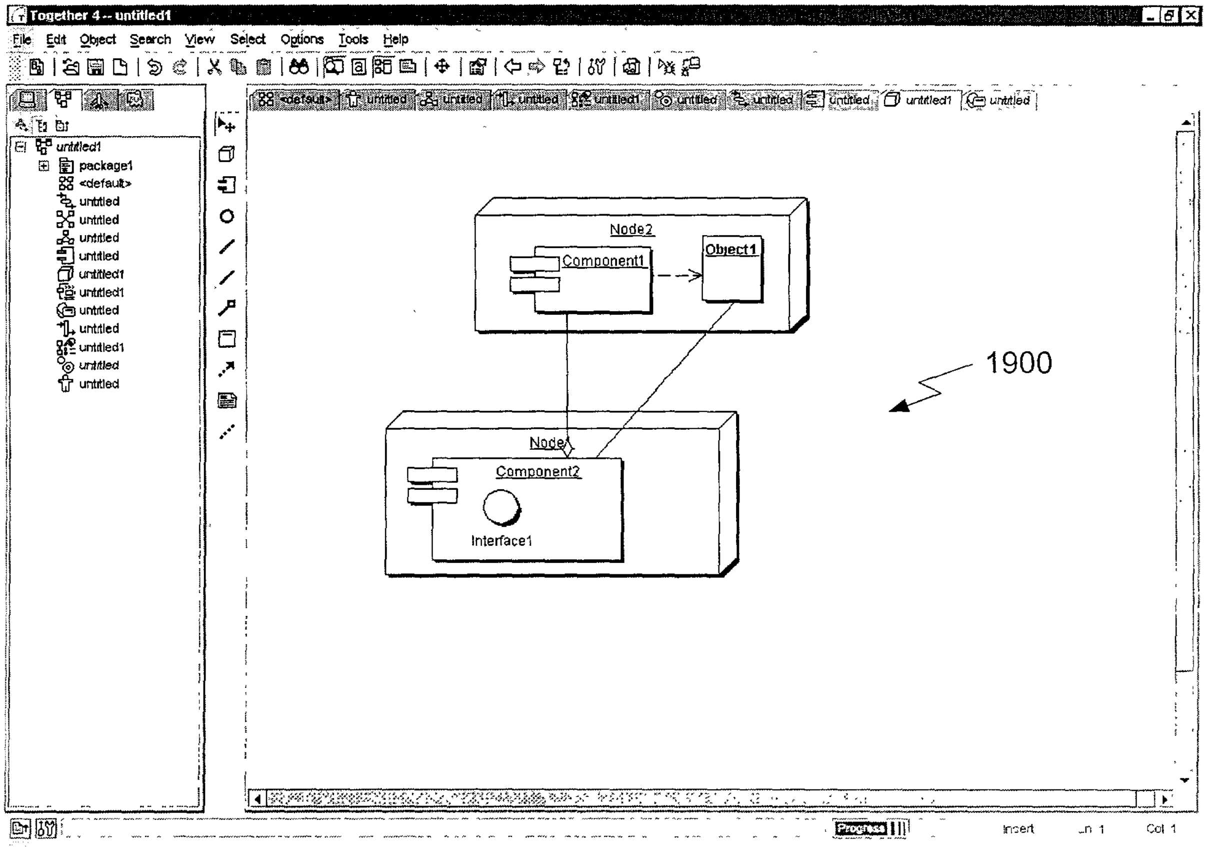
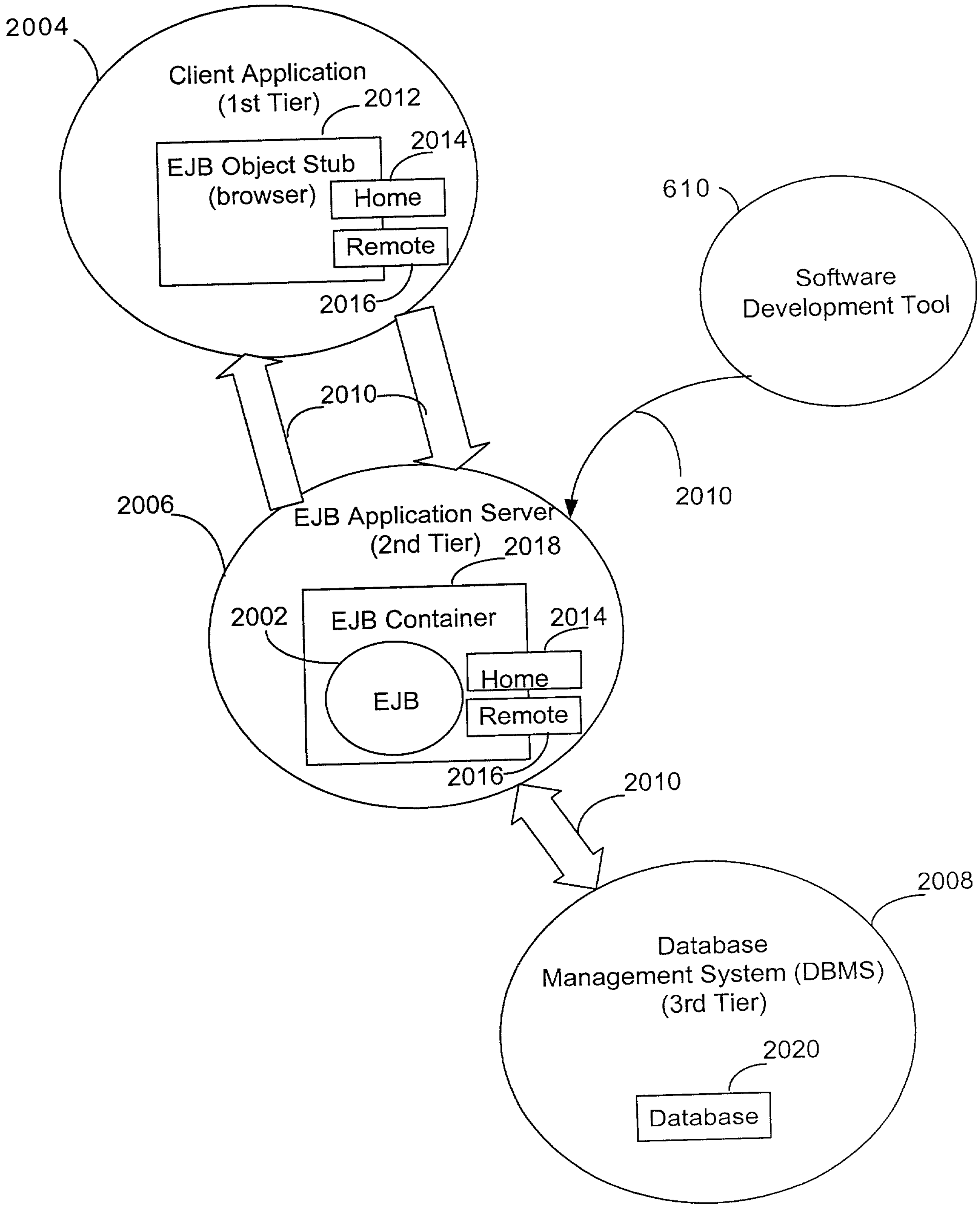

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
<default>
untitled
untitled
untitled
untitled1
untitled
untitled
untitled
untitled1
untitled
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
Node2
Component1
Object1
Node
Component2
Interface1
1900
Insert
Ln 1
Col 1

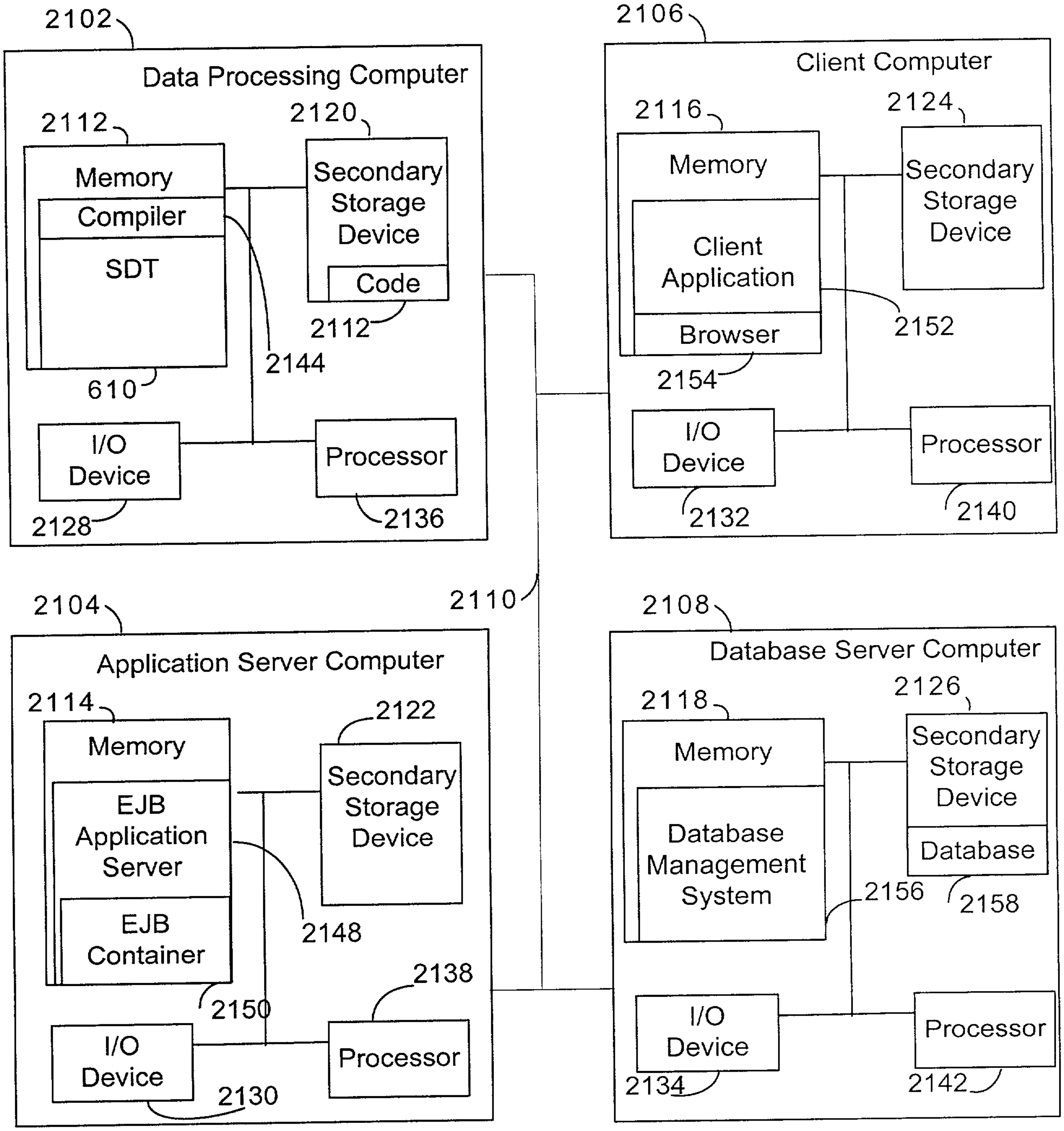
FIG. 19

FIG. 20



2004
Client Application
(1st Tier)
2012
EJB Object Stub
(browser)
2014
Home
Remote
2016
610
Software
Development Tool
2010
2010
2006
EJB Application Server
(2nd Tier)
2018
2002
EJB Container
2014
EJB
Home
Remote
2016
2010
2008
Database
Management System (DBMS)
(3rd Tier)
2020
Database

FIG. 21



2102
Data Processing Computer
2112
Memory
Compiler
SDT
610
2120
Secondary Storage Device
Code
2112
2144
I/O Device
2128
Processor
2136
2106
Client Computer
2116
Memory
Client Application
Browser
2154
2124
Secondary Storage Device
2152
I/O Device
2132
Processor
2140
2110
2104
Application Server Computer
2114
Memory
EJB Application Server
EJB Container
2150
2122
Secondary Storage Device
2148
2138
I/O Device
2130
Processor
2108
Database Server Computer
2118
Memory
Database Management System
2126
Secondary Storage Device
Database
2156
2158
I/O Device
2134
Processor
2142

10023400 " 545E6560

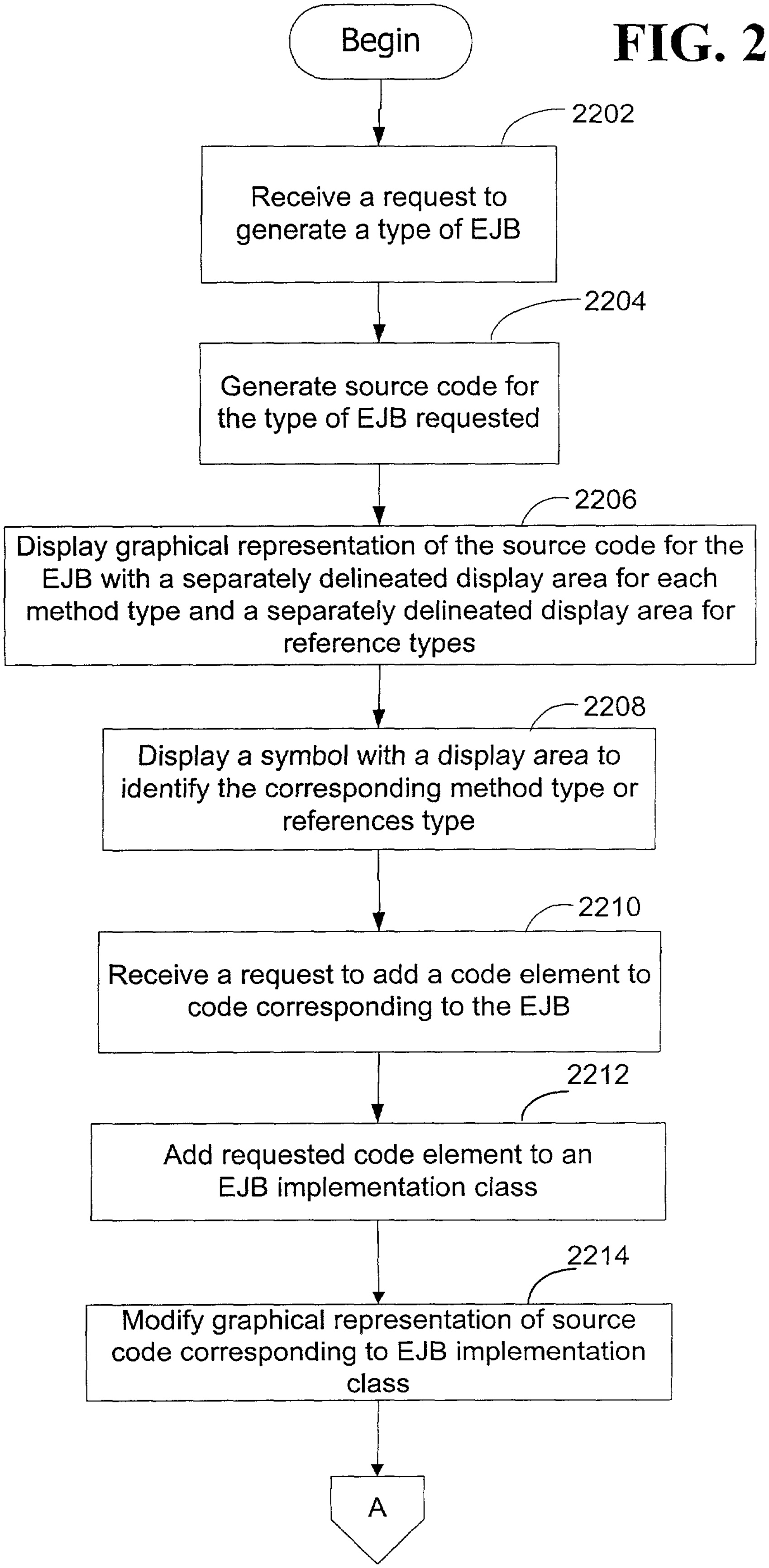

Begin
2202
Receive a request to generate a type of EJB
2204
Generate source code for the type of EJB requested
2206
Display graphical representation of the source code for the EJB with a separately delineated display area for each method type and a separately delineated display area for reference types
2208
Display a symbol with a display area to identify the corresponding method type or references type
2210
Receive a request to add a code element to code corresponding to the EJB
2212
Add requested code element to an EJB implementation class
2214
Modify graphical representation of source code corresponding to EJB implementation class
A

FIG. 22A

09983645.042001

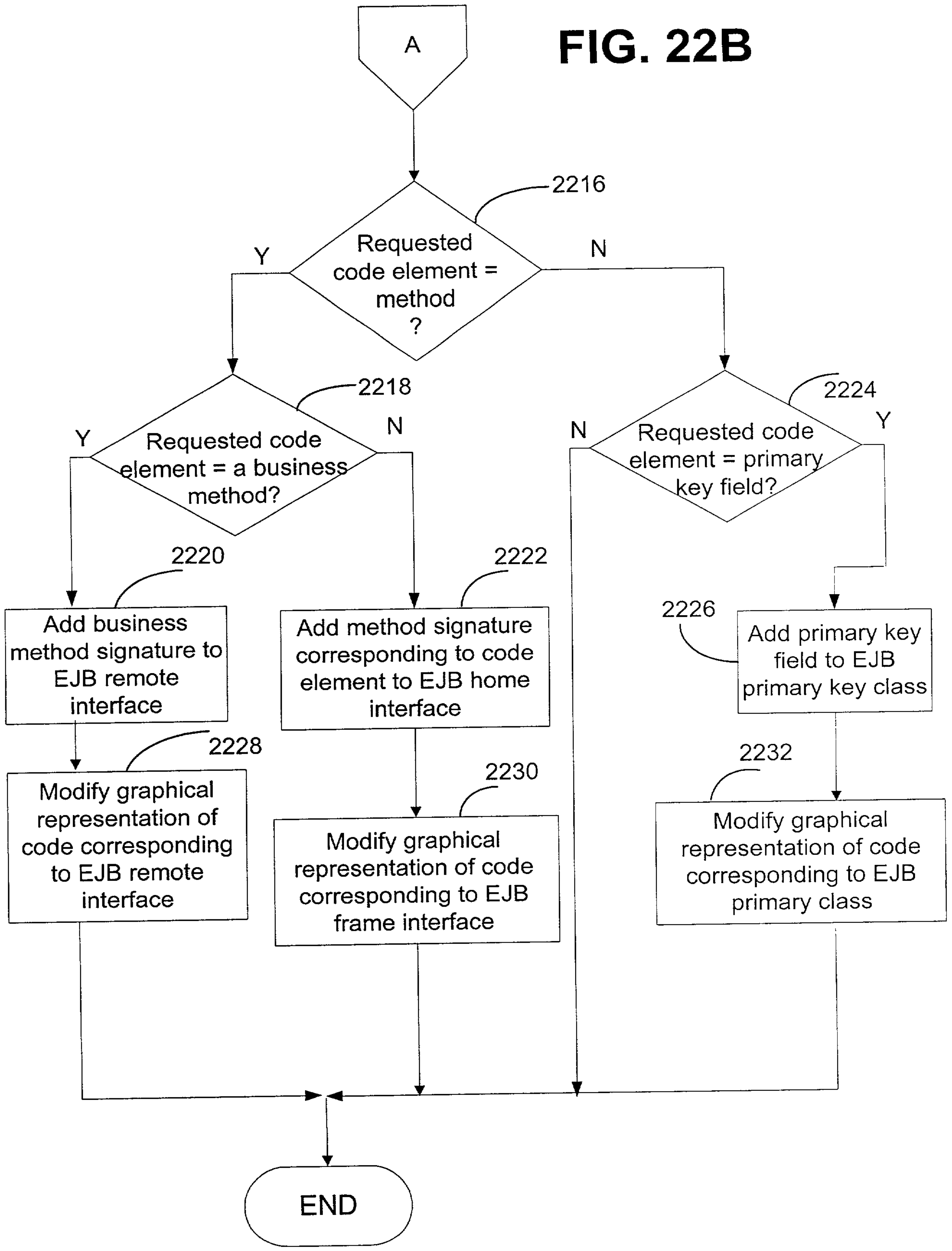
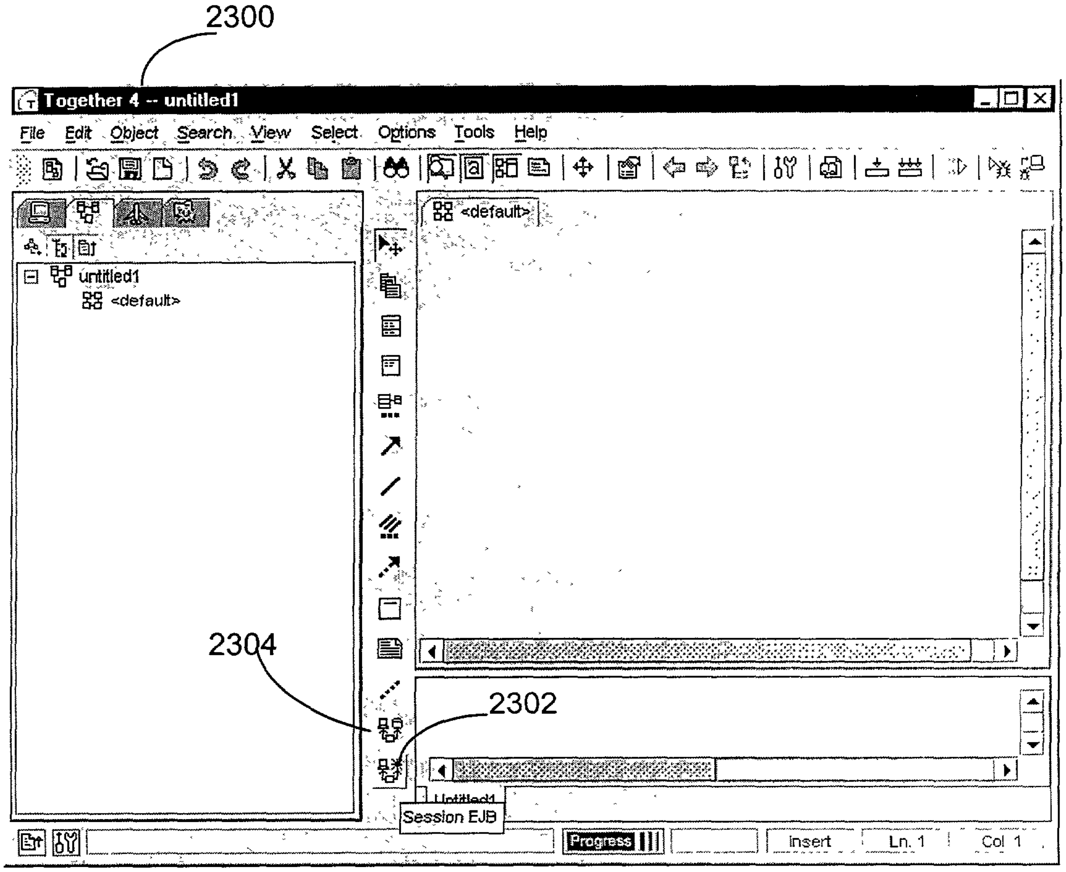

A
2216
Requested code element = method ?
Y
N
2218
Requested code element = a business method?
Y
N
2224
Requested code element = primary key field?
N
Y
2220
Add business method signature to EJB remote interface
2222
Add method signature corresponding to code element to EJB home interface
2226
Add primary key field to EJB primary key class
2228
Modify graphical representation of code corresponding to EJB remote interface
2230
Modify graphical representation of code corresponding to EJB frame interface
2232
Modify graphical representation of code corresponding to EJB primary class
END

FIG. 22B

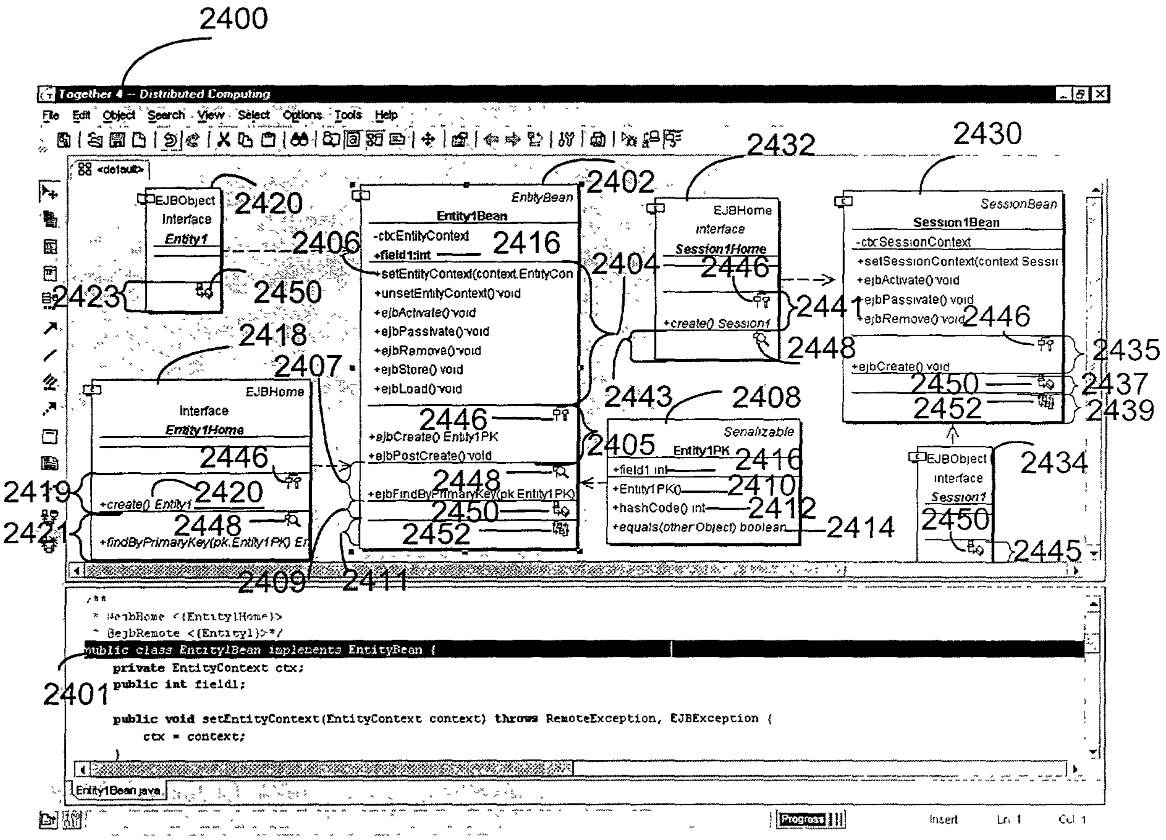
09593546 .061401

FIG. 23


2300
Together 4 -- untitled1
File
Edit
Object
Search
View
Select
Options
Tools
Help
untitled1
<default>
<default>
2304
2302
Untitled1
Session EJB
Progress
Insert
Ln. 1
Col 1

09835656 .042001

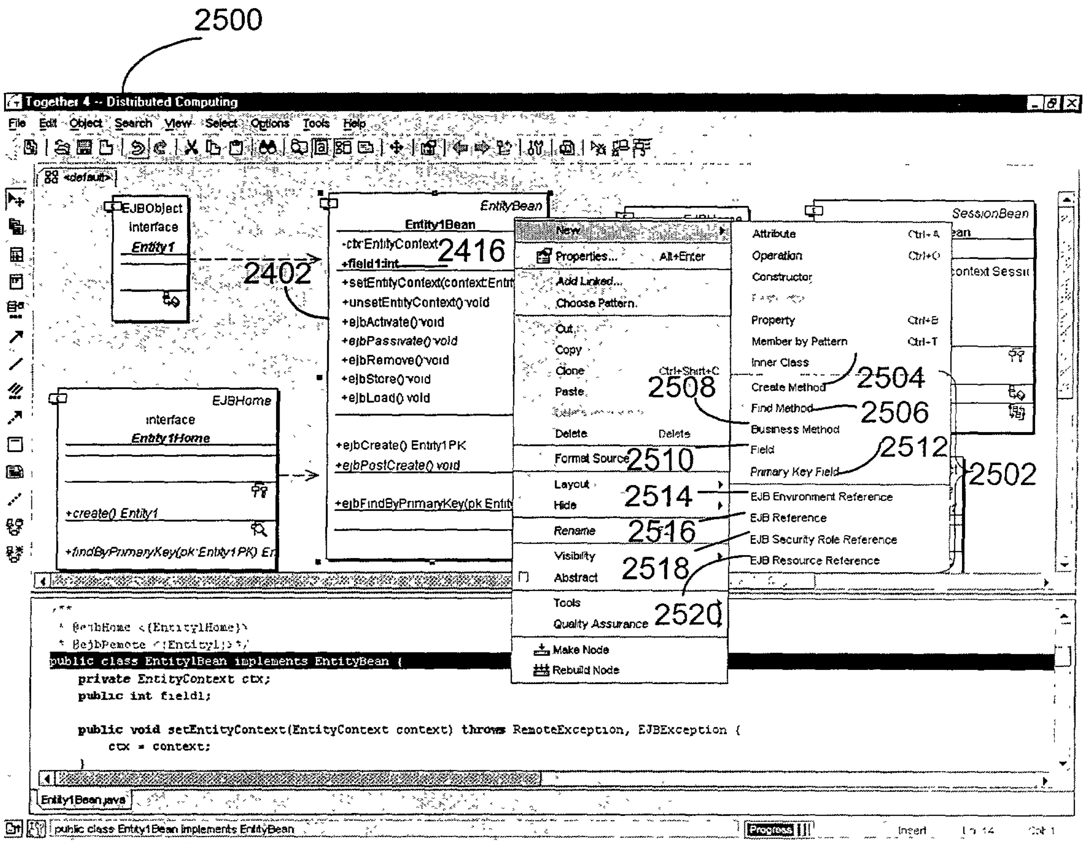
FIG. 24


2400
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
EJBObject
Interface
Entity1
2420
2423
2450
EntityBean
Entity1Bean
-ctxEntityContext
+field1:int
+setEntityContext(context EntityCon
+unsetEntityContext() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbFindByPrimaryKey(pk Entity1PK)
2402
2406
2416
2404
2407
2446
2448
2450
2452
2405
2409
2411
2418
EJBHome
Interface
Entity1Home
2446
+create() Entity1
2420
2419
2448
2421
+findByPrimaryKey(pk.Entity1PK) En
2432
EJBHome
interface
Session1Home
2446
+create() Session1
2441
2448
2443
2408
Serializable
Entity1PK
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
2416
2410
2412
2414
2430
SessionBean
Session1Bean
-ctxSessionContext
+setSessionContext(context Sessi
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbCreate() void
2446
2435
2450
2437
2452
2439
EJBObject
interface
Session1
2434
2450
2445
2401
Entity1Bean.java
Progress
Insert
Ln 1
Col 1

```
/**
 * @ejbHome <{Entity1Home}>
 * @ejbRemote <{Entity1}>*/
public class Entity1Bean implements EntityBean {
    private EntityContext ctx;
    public int field1;

    public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
        ctx = context;
    }
```

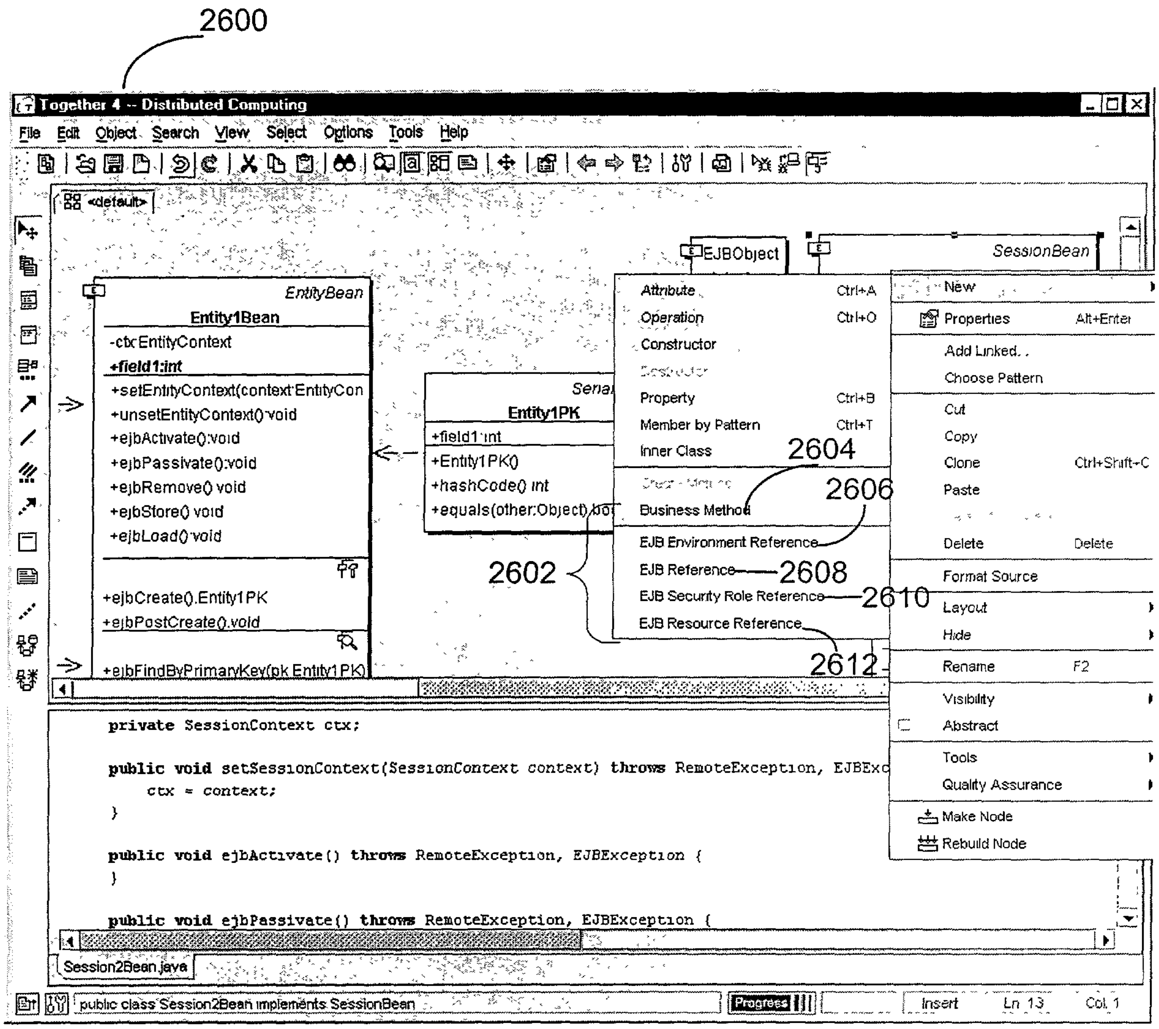
FIG. 25


2500
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
EJBObject
interface
Entity1
2402
EntityBean
Entity1Bean
-ctx:EntityContext
+field1:int
2416
+setEntityContext(context:Entit
+unsetEntityContext():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbStore():void
+ejbLoad():void
+ejbCreate():Entity1PK
+ejbPostCreate():void
+ejbFindByPrimaryKey(pk:Entit
EJBHome
interface
Entity1Home
+create():Entity1
+findByPrimaryKey(pk:Entity1PK):En
SessionBean
ean
context:Sessi
New
Properties... Alt+Enter
Add Linked...
Choose Pattern...
Cut
Copy
Clone Ctrl+Shift+C
Paste
Delete Delete
Format Source
Layout
Hide
Rename
Visibility
Abstract
Tools
Quality Assurance
Make Node
Rebuild Node
Attribute Ctrl+A
Operation Ctrl+O
Constructor
Property Ctrl+B
Member by Pattern Ctrl+T
Inner Class
Create Method
Find Method
Business Method
Field
Primary Key Field
EJB Environment Reference
EJB Reference
EJB Security Role Reference
EJB Resource Reference
2504
2506
2508
2510
2512
2502
2514
2516
2518
2520
Entity1Bean.java
public class Entity1Bean implements EntityBean
Progress
Insert

```
/**
 * @ejbHome <{Entity1Home}>
 * @ejbRemote <{Entity1}>*/
public class Entity1Bean implements EntityBean {
    private EntityContext ctx;
    public int field1;

    public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
        ctx = context;
    }
```

FIG. 26


2600
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
EJBObject
SessionBean
EntityBean
Entity1Bean
-ctx:EntityContext
+field1:int
+setEntityContext(context:EntityCon
+unsetEntityContext():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbStore():void
+ejbLoad():void
+ejbCreate():Entity1PK
+ejbPostCreate():void
+ejbFindByPrimaryKey(pk:Entity1PK)
Serial
Entity1PK
+field1:int
+Entity1PK()
+hashCode():int
+equals(other:Object):boo
Attribute Ctrl+A
Operation Ctrl+O
Constructor
Destructor
Property Ctrl+B
Member by Pattern Ctrl+T
Inner Class
Create Method
Business Method
EJB Environment Reference
EJB Reference
EJB Security Role Reference
EJB Resource Reference
2602
2604
2606
2608
2610
2612
New
Properties Alt+Enter
Add Linked...
Choose Pattern
Cut
Copy
Clone Ctrl+Shift+C
Paste
Delete Delete
Format Source
Layout
Hide
Rename F2
Visibility
Abstract
Tools
Quality Assurance
Make Node
Rebuild Node
Session2Bean.java
public class Session2Bean implements SessionBean
Progress
Insert
Ln 13
Col 1

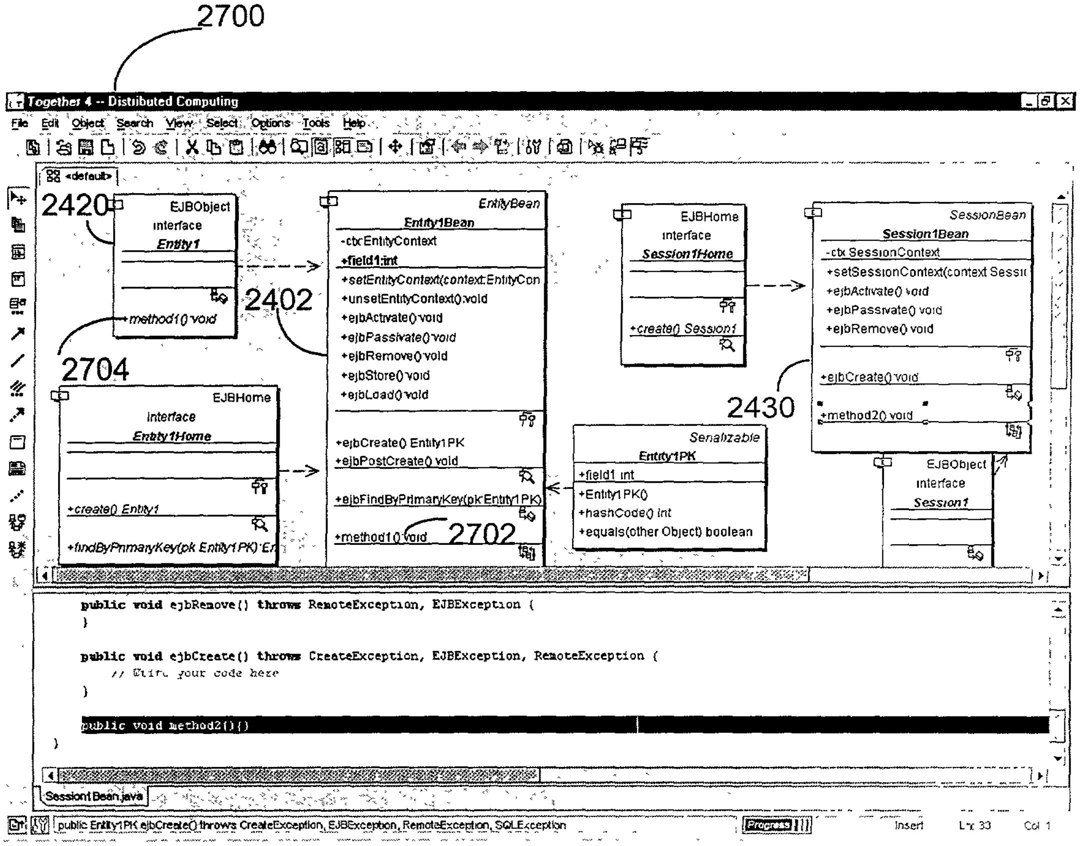
```
    private SessionContext ctx;

    public void setSessionContext(SessionContext context) throws RemoteException, EJBExc
        ctx = context;
    }

    public void ejbActivate() throws RemoteException, EJBException {
    }

    public void ejbPassivate() throws RemoteException, EJBException {
```

FIG. 27


2700
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
2420
EJBObject
interface
Entity1
+method1() void
2704
2402
EJBHome
interface
Entity1Home
+create() Entity1
+findByPrimaryKey(pk Entity1PK) En
EntityBean
Entity1Bean
-ctx EntityContext
+field1:int
+setEntityContext(context:EntityCon
+unsetEntityContext():void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbFindByPrimaryKey(pk Entity1PK)
+method1() void
2702
EJBHome
interface
Session1Home
+create() Session1
Serializable
Entity1PK
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
SessionBean
Session1Bean
-ctx SessionContext
+setSessionContext(context Sessi
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbCreate() void
+method2() void
2430
EJBObject
interface
Session1
Session1Bean.java
Progress
Insert
Ln 33
Col 1

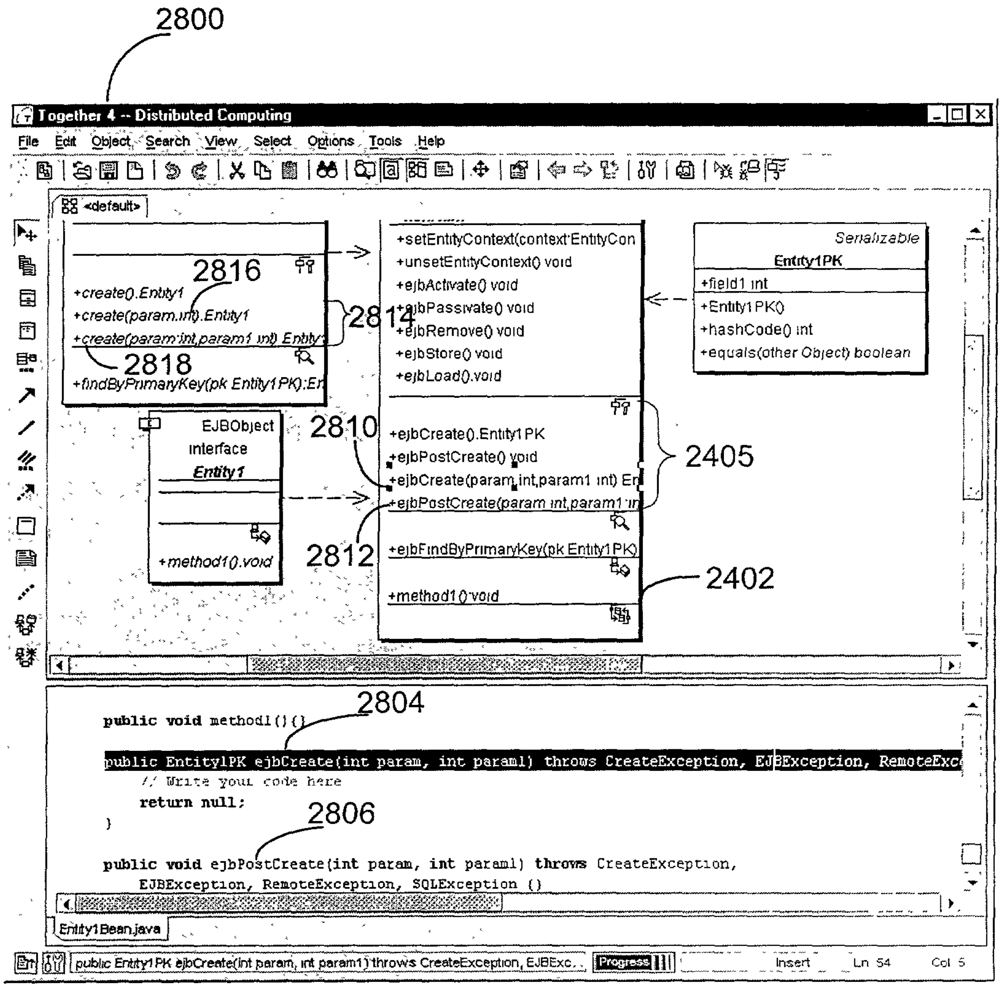
```
    public void ejbRemove() throws RemoteException, EJBException {
    }

    public void ejbCreate() throws CreateException, EJBException, RemoteException {
        // Write your code here
    }

    public void method2(){}
}
```

public Entity1PK ejbCreate() throws CreateException, EJBException, RemoteException, SQLException

FIG. 28


2800
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
2816
+create().Entity1
+create(param.int).Entity1
+create(param:int,param1 int) Entity
2814
2818
+findByPrimaryKey(pk Entity1PK):En
EJBObject
interface
Entity1
+method1().void
2810
2812
+setEntityContext(context:EntityCon
+unsetEntityContext() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad().void
+ejbCreate().Entity1PK
+ejbPostCreate() void
+ejbCreate(param int,param1 int) En
+ejbPostCreate(param int,param1 in
+ejbFindByPrimaryKey(pk Entity1PK)
+method1() void
2405
2402
Serializable
Entity1PK
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
2804
2806
Entity1Bean.java
Progress
Insert
Ln 54
Col 5

```
public void method1(){}

public Entity1PK ejbCreate(int param, int param1) throws CreateException, EJBException, RemoteExc
    // Write your code here
    return null;
}

public void ejbPostCreate(int param, int param1) throws CreateException,
    EJBException, RemoteException, SQLException ()
```

public Entity1PK ejbCreate(int param, int param1) throws CreateException, EJBExc...

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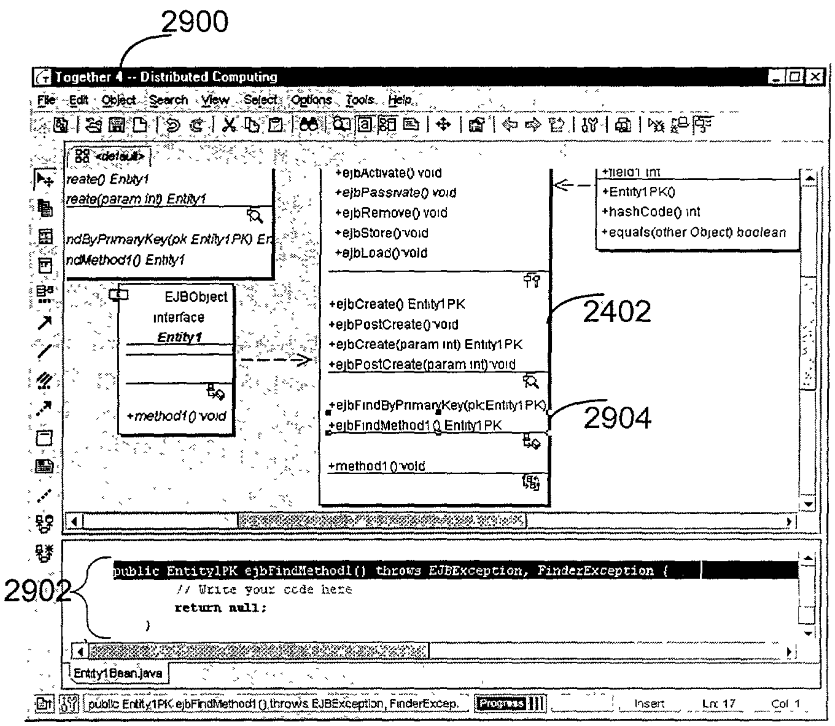
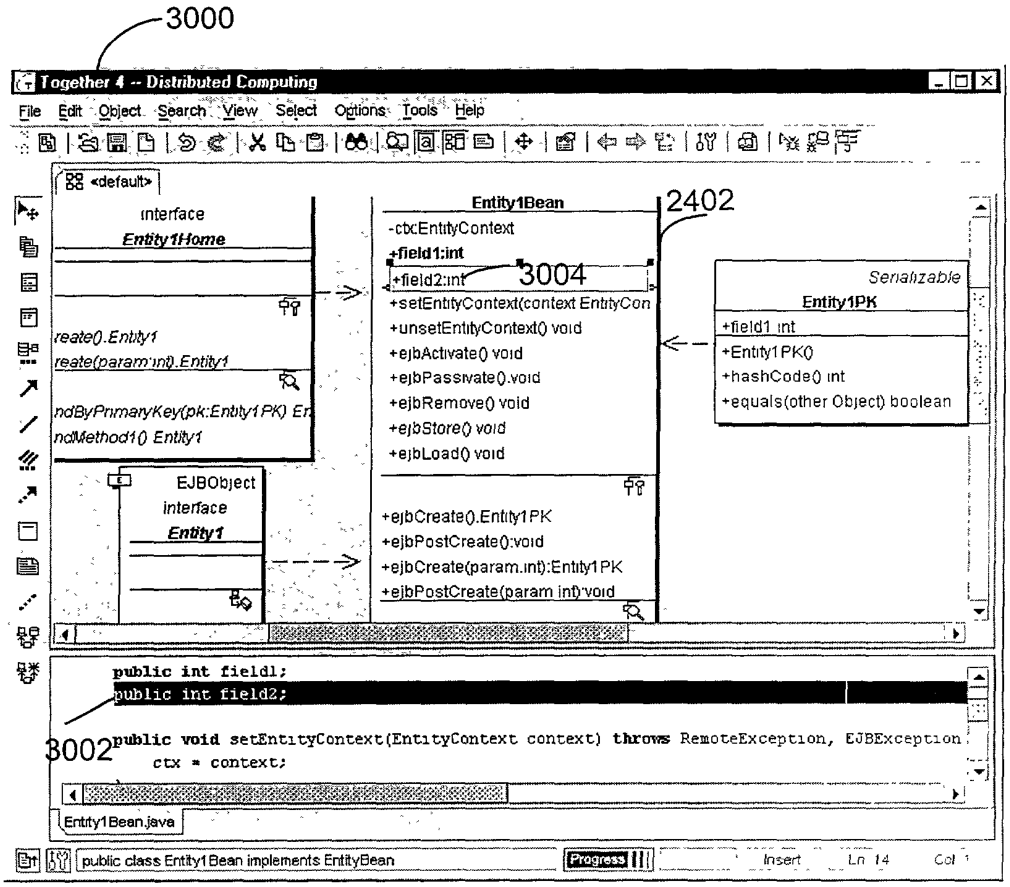
FIG. 29


2900
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
reate() Entity1
reate(param int) Entity1
ndByPrimaryKey(pk Entity1PK) En
ndMethod1() Entity1
EJBObject
interface
Entity1
+method1() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbCreate(param int) Entity1PK
+ejbPostCreate(param int) void
+ejbFindByPrimaryKey(pk:Entity1PK)
+ejbFindMethod1() Entity1PK
+method1() void
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
2402
2904
2902
Entity1Bean.java
Progress
Insert
Ln: 17
Col 1

```
public Entity1PK ejbFindMethod1() throws EJBException, FinderException {
        // Write your code here
        return null;
    }
```

public Entity1PK ejbFindMethod1() throws EJBException, FinderExcep.

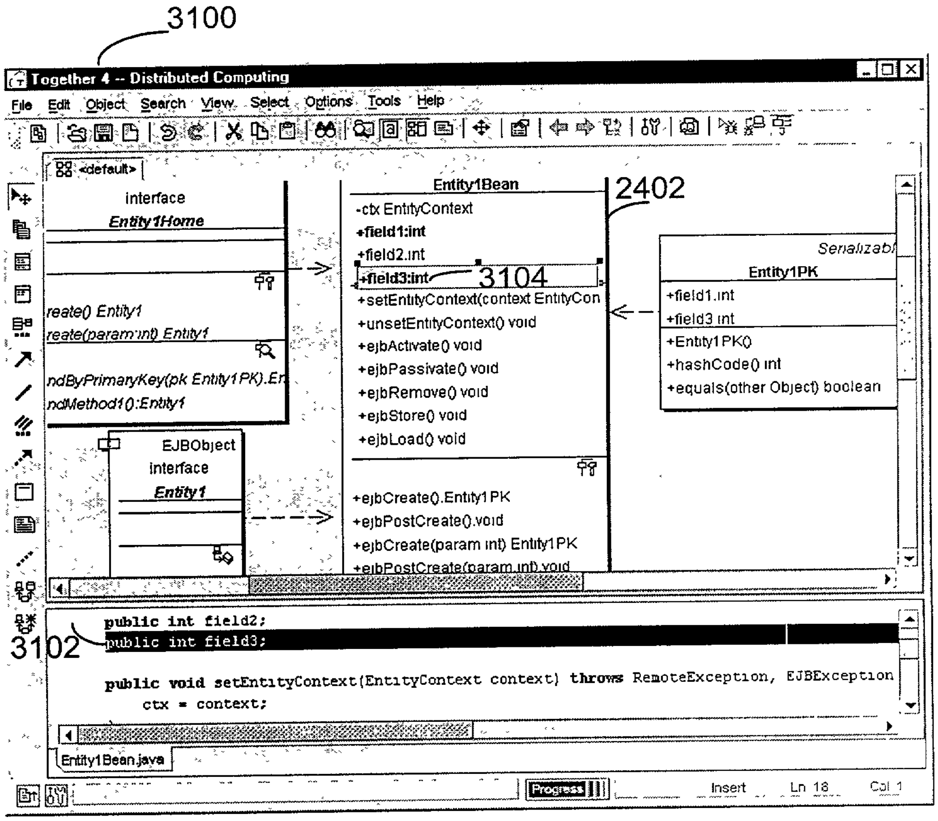
FIG. 30


3000
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
interface
Entity1Home
reate().Entity1
reate(param:int).Entity1
ndByPrimaryKey(pk:Entity1PK) En
ndMethod1() Entity1
EJBObject
interface
Entity1
Entity1Bean
-ctxEntityContext
+field1:int
+field2:int
3004
+setEntityContext(context EntityCon
+unsetEntityContext() void
+ejbActivate() void
+ejbPassivate().void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate().Entity1PK
+ejbPostCreate():void
+ejbCreate(param.int):Entity1PK
+ejbPostCreate(param int) void
2402
Serializable
Entity1PK
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
3002
Entity1Bean.java
Progress
Insert
Ln 14
Col 1

```
public int field1;
public int field2;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException
    ctx = context;
```

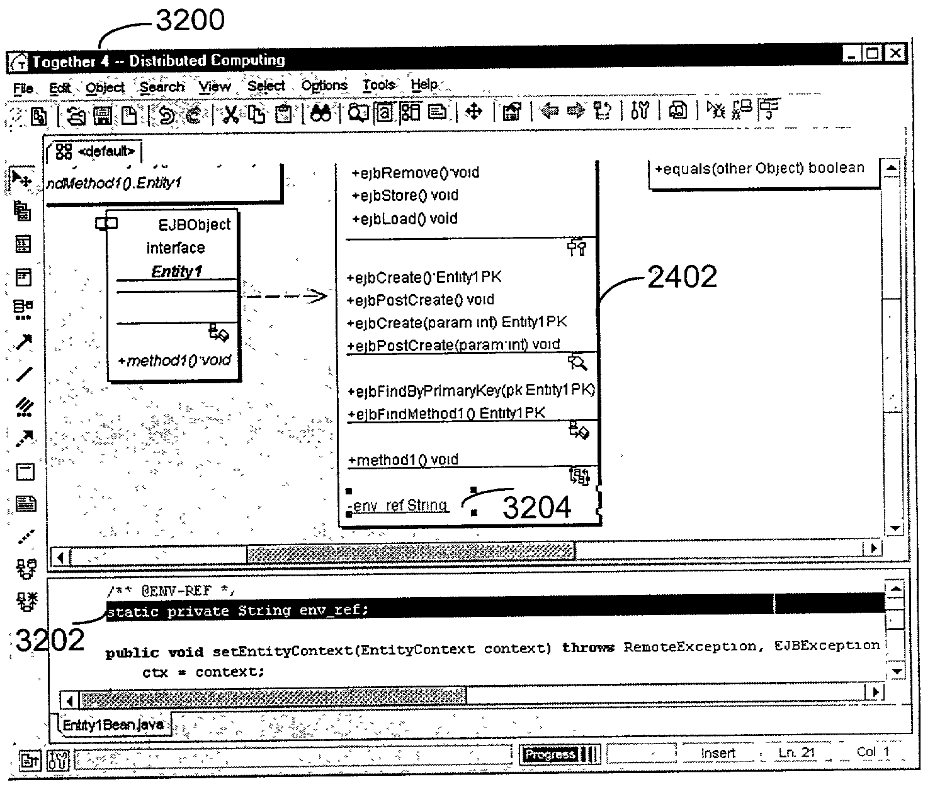
public class Entity1Bean implements EntityBean

FIG. 31


3100
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
interface
Entity1Home
reate() Entity1
reate(param int) Entity1
ndByPrimaryKey(pk Entity1PK).En
ndMethod1():Entity1
EJBObject
interface
Entity1
Entity1Bean
-ctx EntityContext
+field1:int
+field2.int
+field3:int
3104
+setEntityContext(context EntityCon
+unsetEntityContext() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate().Entity1PK
+ejbPostCreate().void
+ejbCreate(param int) Entity1PK
+ejbPostCreate(param int) void
2402
Serializabl
Entity1PK
+field1.int
+field3 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
3102
Entity1Bean.java
Progress
Insert
Ln 18
Col 1

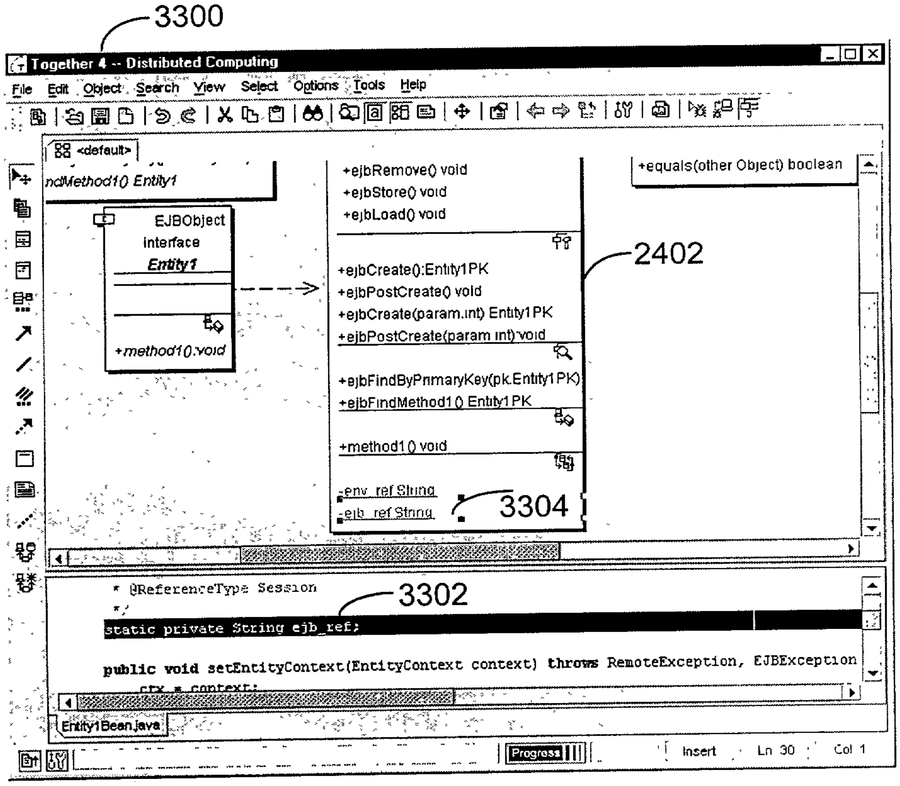
```
public int field2;
public int field3;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException
    ctx = context;
```

FIG. 32


3200
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
ndMethod1().Entity1
EJBObject
interface
Entity1
+method1() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbCreate(param int) Entity1PK
+ejbPostCreate(param int) void
+ejbFindByPrimaryKey(pk Entity1PK)
+ejbFindMethod1() Entity1PK
+method1() void
-env_ref String
3204
+equals(other Object) boolean
2402
3202
Entity1Bean.java
Progress
Insert
Ln. 21
Col 1

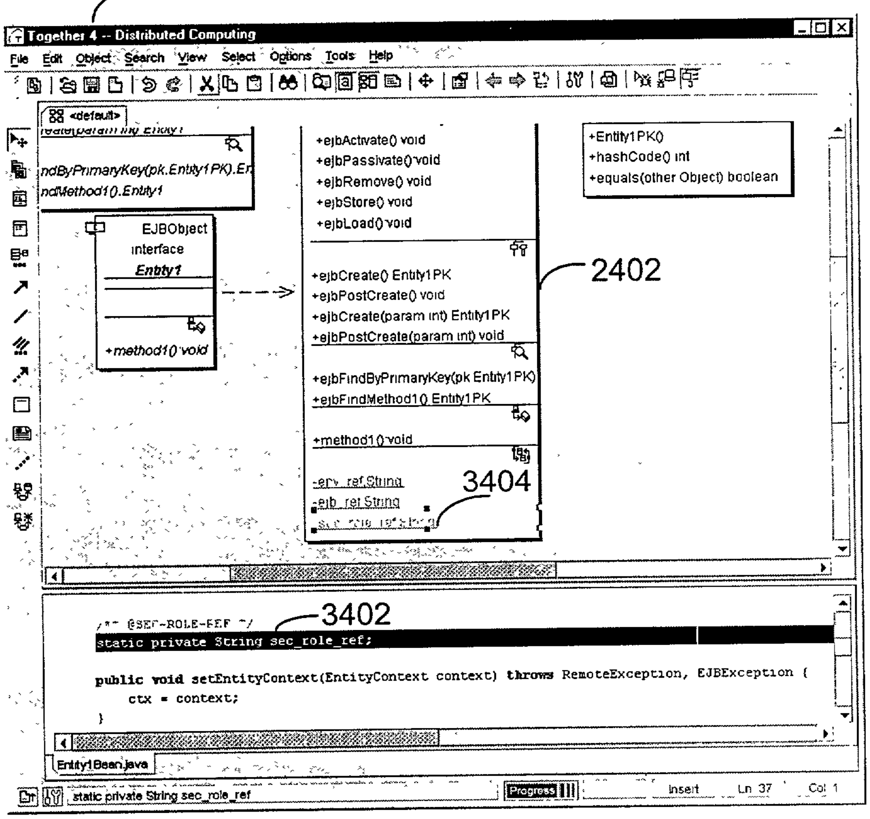
```
/** @ENV-REF */
static private String env_ref;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException
    ctx = context;
```

FIG. 33


3300
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
ndMethod1() Entity1
EJBObject
interface
Entity1
+method1():void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate():Entity1PK
+ejbPostCreate() void
+ejbCreate(param.int) Entity1PK
+ejbPostCreate(param int) void
+ejbFindByPrimaryKey(pk.Entity1PK)
+ejbFindMethod1() Entity1PK
+method1() void
-env_ref String
-ejb_ref String
3304
+equals(other Object) boolean
2402
3302
Entity1Bean.java
Progress
Insert
Ln 30
Col 1

```
 * @ReferenceType Session
 */
static private String ejb_ref;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException
    ctx = context;
```

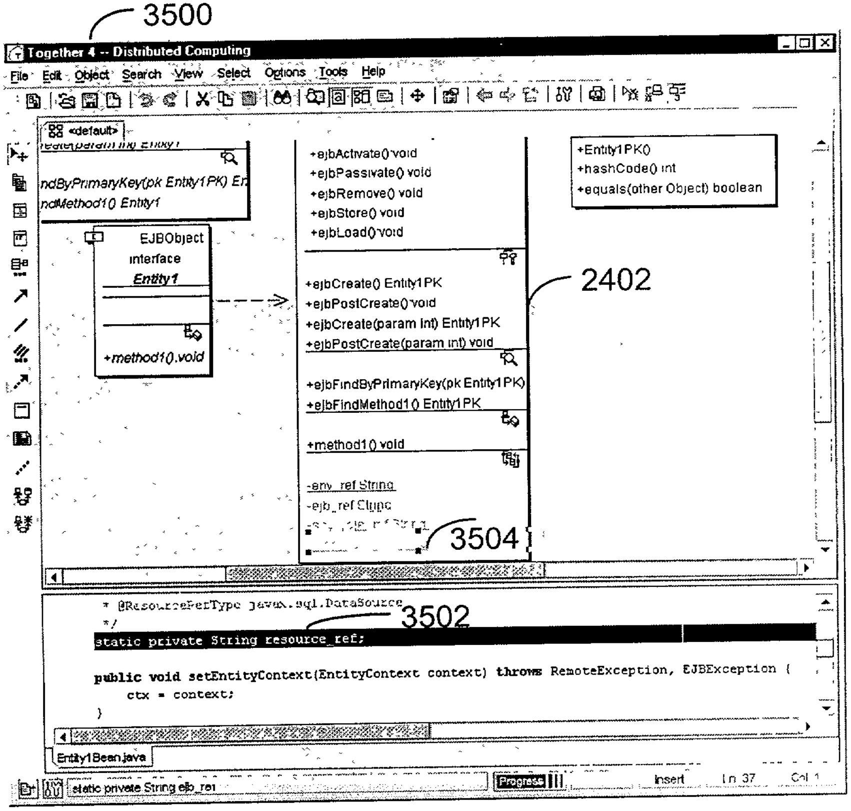
FIG. 34


3400
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
reate(param int) Entity1
ndByPrimaryKey(pk Entity1PK).En
ndMethod1().Entity1
EJBObject
interface
Entity1
+method1():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbStore():void
+ejbLoad():void
+ejbCreate():Entity1PK
+ejbPostCreate():void
+ejbCreate(param int):Entity1PK
+ejbPostCreate(param int):void
+ejbFindByPrimaryKey(pk:Entity1PK)
+ejbFindMethod1():Entity1PK
+method1():void
-env_ref:String
-ejb_ref:String
-sec_role_ref:String
3404
+Entity1PK()
+hashCode():int
+equals(other:Object):boolean
2402
3402
Entity1Bean.java
Progress
Insert
Ln 37
Col 1

```
/** @SEC-ROLE-REF */
static private String sec_role_ref;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
    ctx = context;
}
```

static private String sec_role_ref

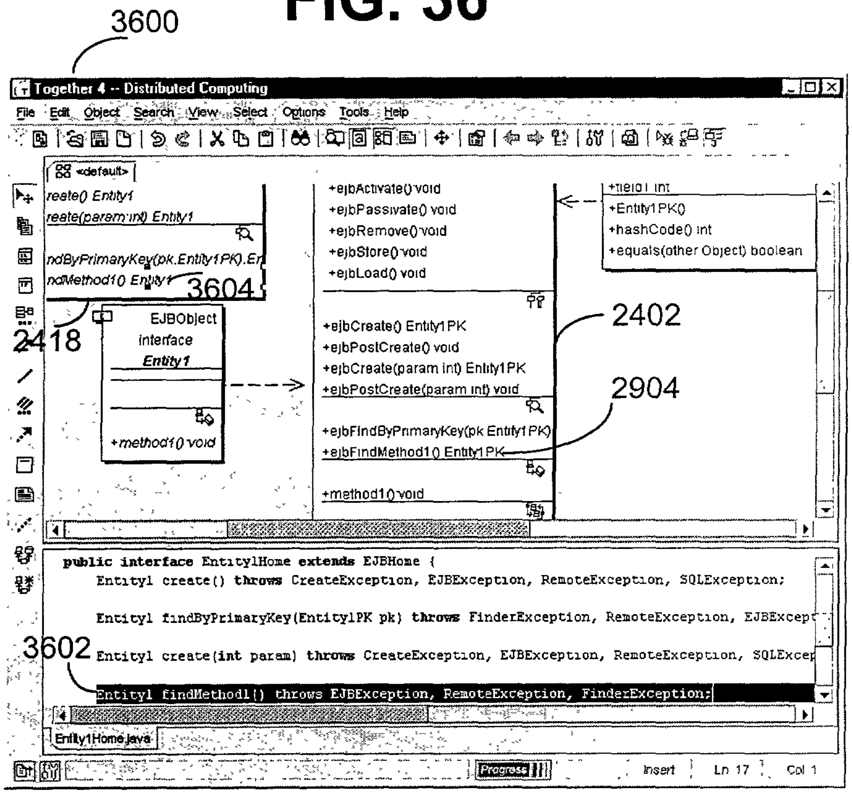
FIG. 35


3500
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
reate(param int) Entity1
ndByPrimaryKey(pk Entity1PK) En
ndMethod1() Entity1
EJBObject
interface
Entity1
+method1():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbStore():void
+ejbLoad():void
+ejbCreate():Entity1PK
+ejbPostCreate():void
+ejbCreate(param int):Entity1PK
+ejbPostCreate(param int):void
+ejbFindByPrimaryKey(pk:Entity1PK)
+ejbFindMethod1():Entity1PK
+method1():void
-env_ref:String
-ejb_ref:String
3504
+Entity1PK()
+hashCode():int
+equals(other:Object):boolean
2402
3502
Entity1Bean.java
Progress
Insert
Ln 37
Col 1

```
 * @ResourceRefType javax.sql.DataSource
 */
static private String resource_ref;

public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
    ctx = context;
}
```

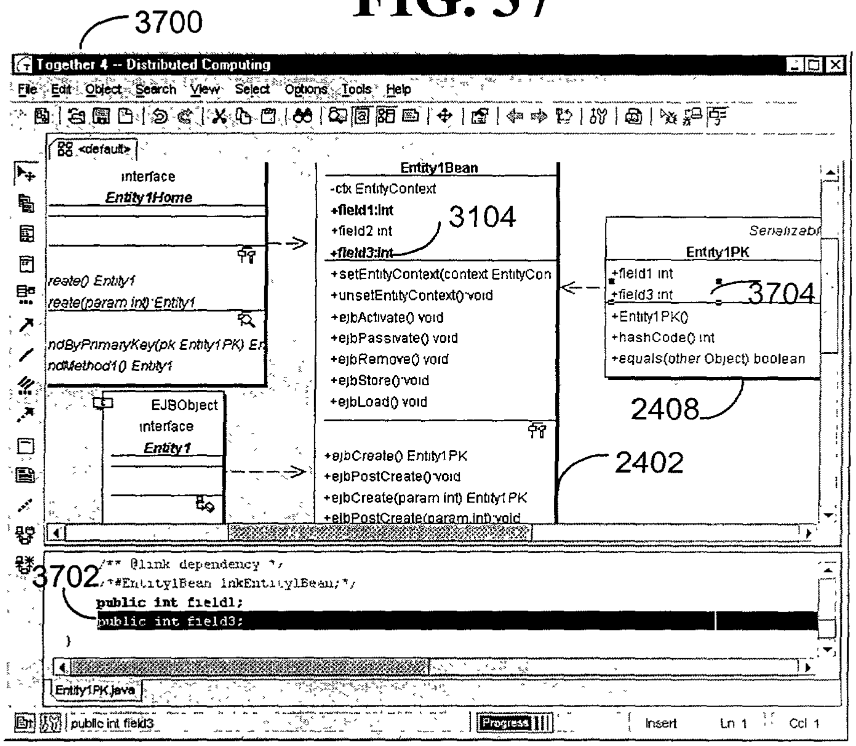
static private String ejb_ref

FIG. 36


3600
Together 4 -- Distributed Computing
File
Edit
Object
Search
View
Select
Options
Tools
Help
<default>
reate() Entity1
reate(param:int) Entity1
ndByPrimaryKey(pk.Entity1PK).En
ndMethod1() Entity1
3604
2418
EJBObject
interface
Entity1
+method1() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbCreate(param int) Entity1PK
+ejbPostCreate(param int) void
+ejbFindByPrimaryKey(pk Entity1PK)
+ejbFindMethod1() Entity1PK
+method1() void
+field1 int
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
2402
2904
3602
Entity1Home.java
Progress
Insert
Ln 17
Col 1

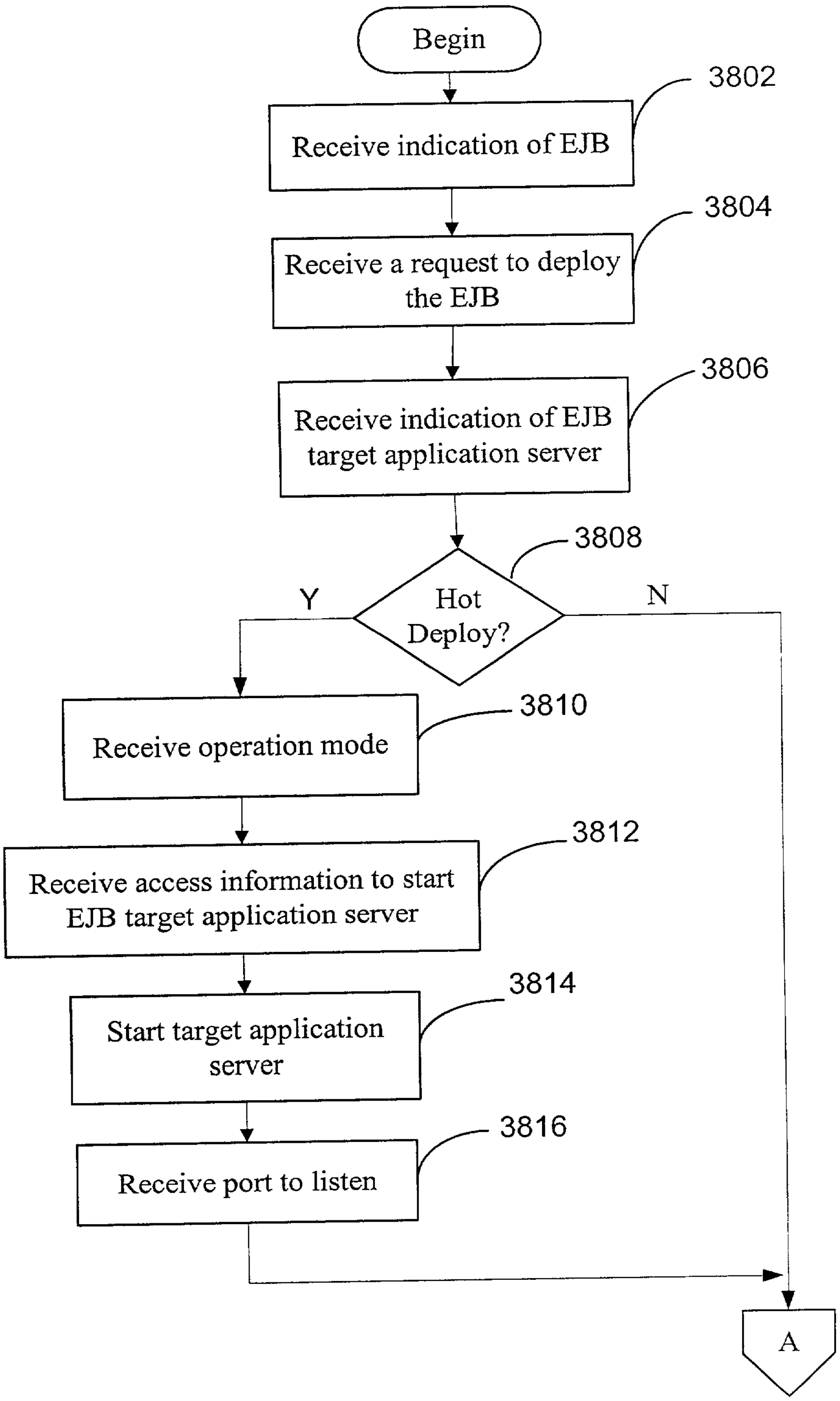
```
public interface Entity1Home extends EJBHome {
    Entity1 create() throws CreateException, EJBException, RemoteException, SQLException;

    Entity1 findByPrimaryKey(Entity1PK pk) throws FinderException, RemoteException, EJBExcept

    Entity1 create(int param) throws CreateException, EJBException, RemoteException, SQLExcep

    Entity1 findMethod1() throws EJBException, RemoteException, FinderException;
```

FIG. 37


3700
Together 4 -- Distributed Computing
File Edit Object Search View Select Options Tools Help
<default>
interface
Entity1Home
reate() Entity1
reate(param int) Entity1
ndByPrimaryKey(pk Entity1PK) En
ndMethod1() Entity1
EJBObject
interface
Entity1
Entity1Bean
-ctx EntityContext
+field1:int
+field2 int
+field3:int
3104
+setEntityContext(context EntityCon
+unsetEntityContext() void
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbStore() void
+ejbLoad() void
+ejbCreate() Entity1PK
+ejbPostCreate() void
+ejbCreate(param int) Entity1PK
+ejbPostCreate(param int) void
Serializabl
Entity1PK
+field1 int
+field3 int
3704
+Entity1PK()
+hashCode() int
+equals(other Object) boolean
2408
2402
3702
Entity1PK.java
public int field3
Progress
Insert
Ln 1
Col 1

```
/** @link dependency */
/*#Entity1Bean lnkEntity1Bean;*/
public int field1;
public int field3;
}
```

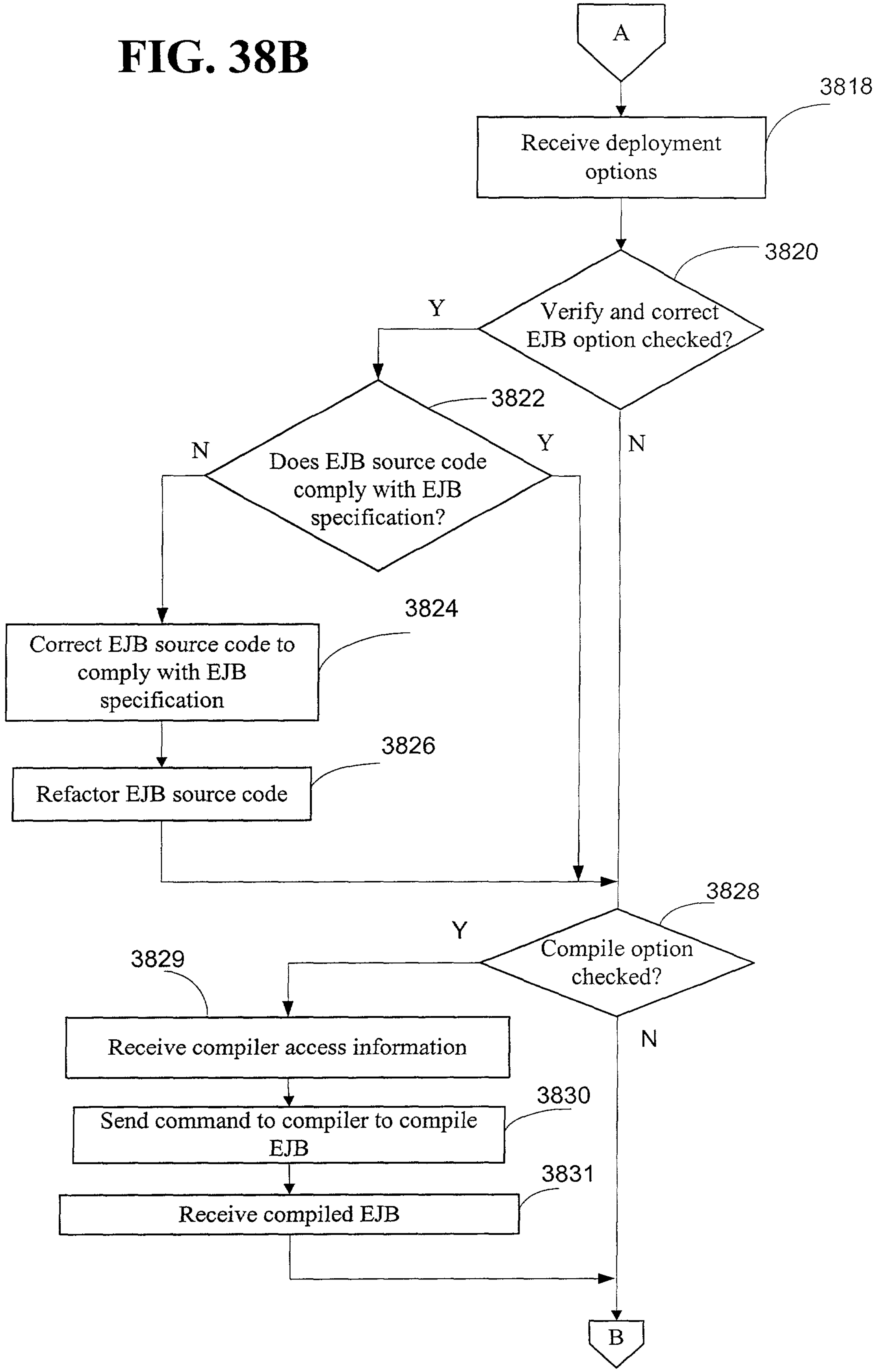
FIG. 38A



Begin
Receive indication of EJB
3802
Receive a request to deploy the EJB
3804
Receive indication of EJB target application server
3806
Hot Deploy?
3808
Y
N
Receive operation mode
3810
Receive access information to start EJB target application server
3812
Start target application server
3814
Receive port to listen
3816
A

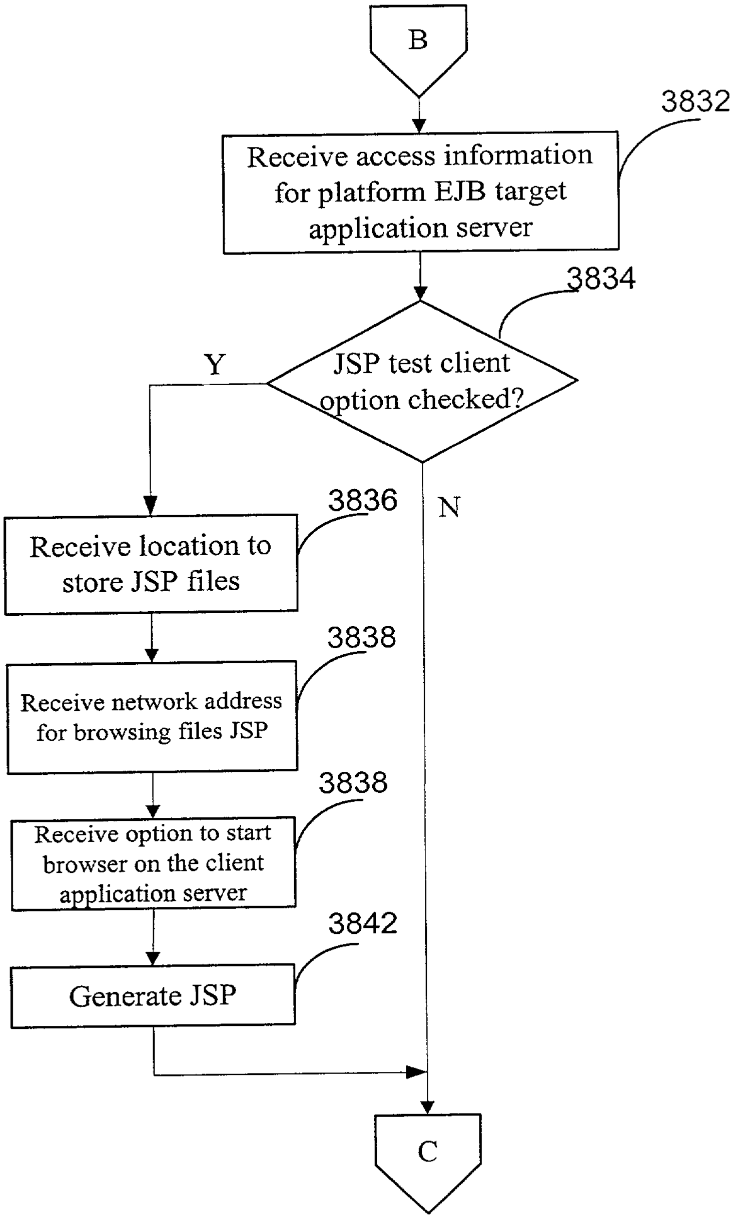
10040 " 54596860

FIG. 38B


A
3818
Receive deployment options
3820
Verify and correct EJB option checked?
Y
N
3822
Does EJB source code comply with EJB specification?
N
Y
3824
Correct EJB source code to comply with EJB specification
3826
Refactor EJB source code
3828
Compile option checked?
Y
N
3829
Receive compiler access information
3830
Send command to compiler to compile EJB
3831
Receive compiled EJB
B

09835645 . 042001

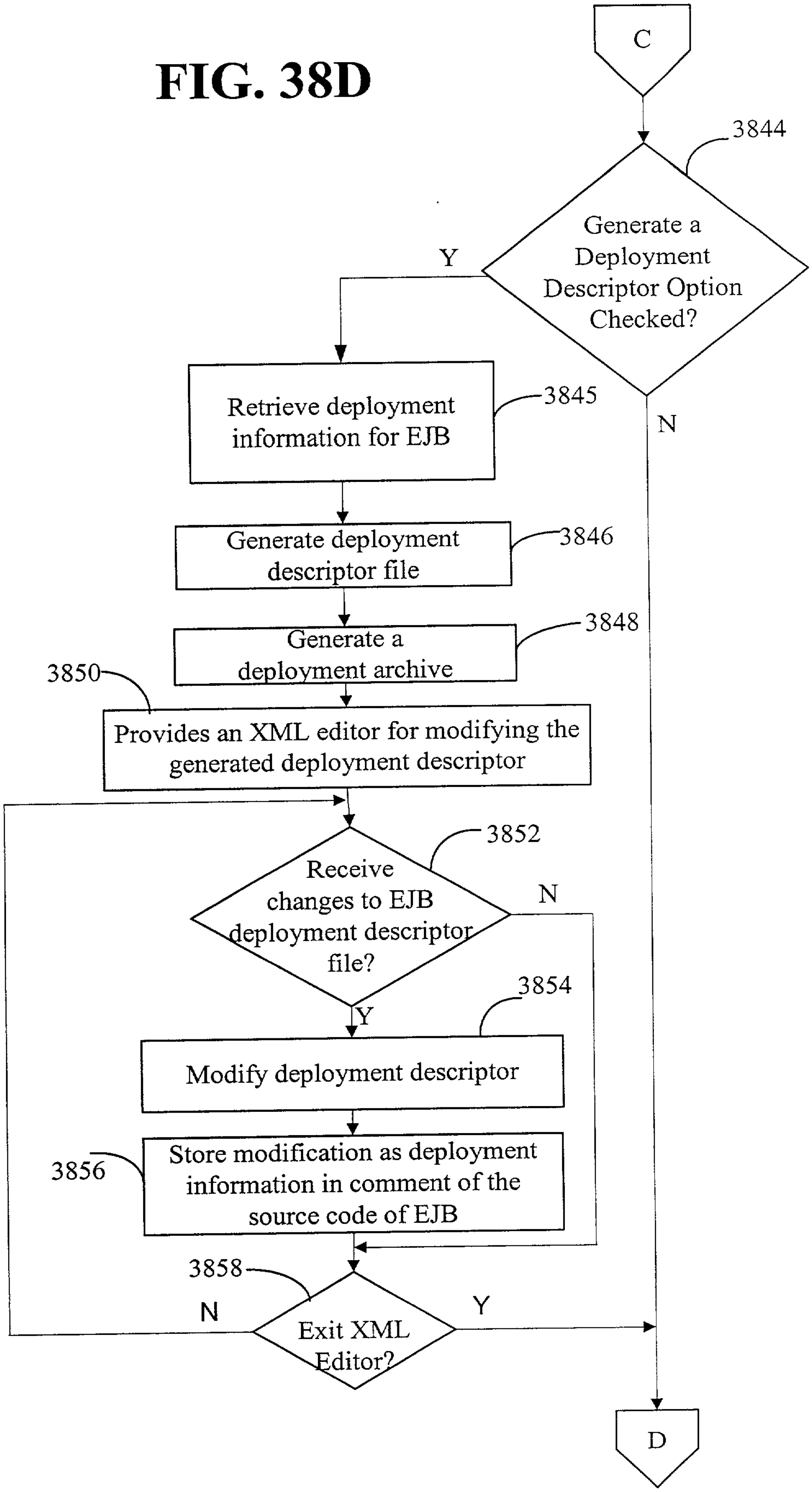
FIG. 38C



B
3832
Receive access information for platform EJB target application server
3834
JSP test client option checked?
Y
N
3836
Receive location to store JSP files
3838
Receive network address for browsing files JSP
3838
Receive option to start browser on the client application server
3842
Generate JSP
C

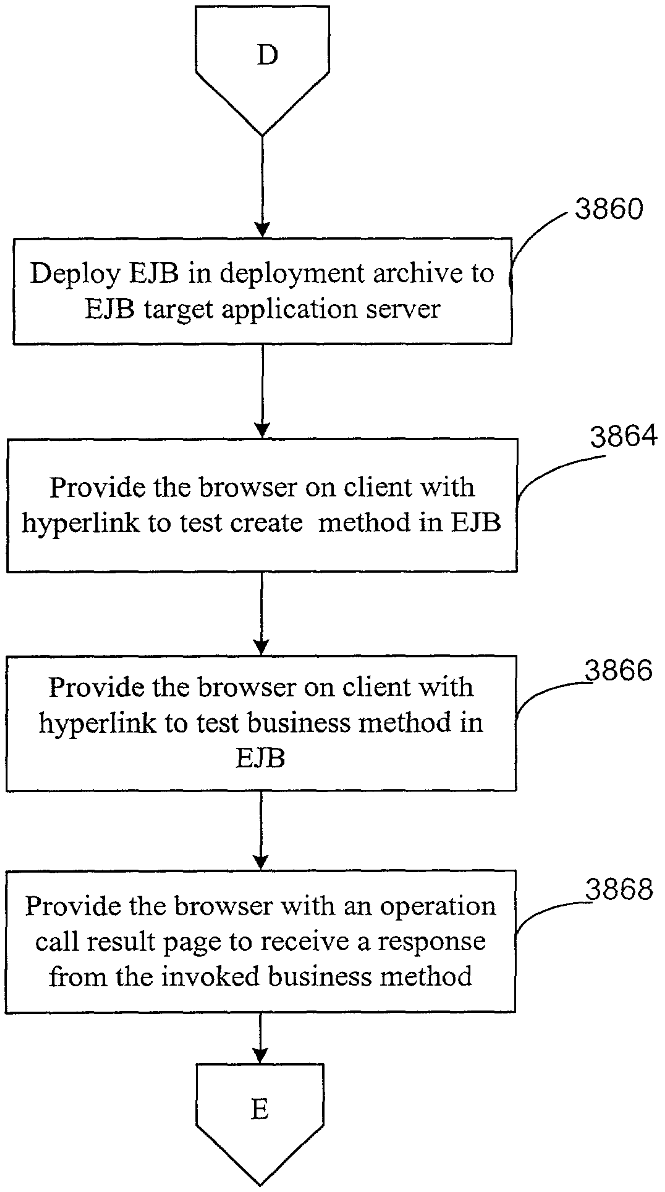
10024045 . 062501

FIG. 38D


C
3844
Generate a Deployment Descriptor Option Checked?
Y
N
Retrieve deployment information for EJB
3845
Generate deployment descriptor file
3846
Generate a deployment archive
3848
3850
Provides an XML editor for modifying the generated deployment descriptor
3852
Receive changes to EJB deployment descriptor file?
N
Y
3854
Modify deployment descriptor
3856
Store modification as deployment information in comment of the source code of EJB
3858
N
Y
Exit XML Editor?
D

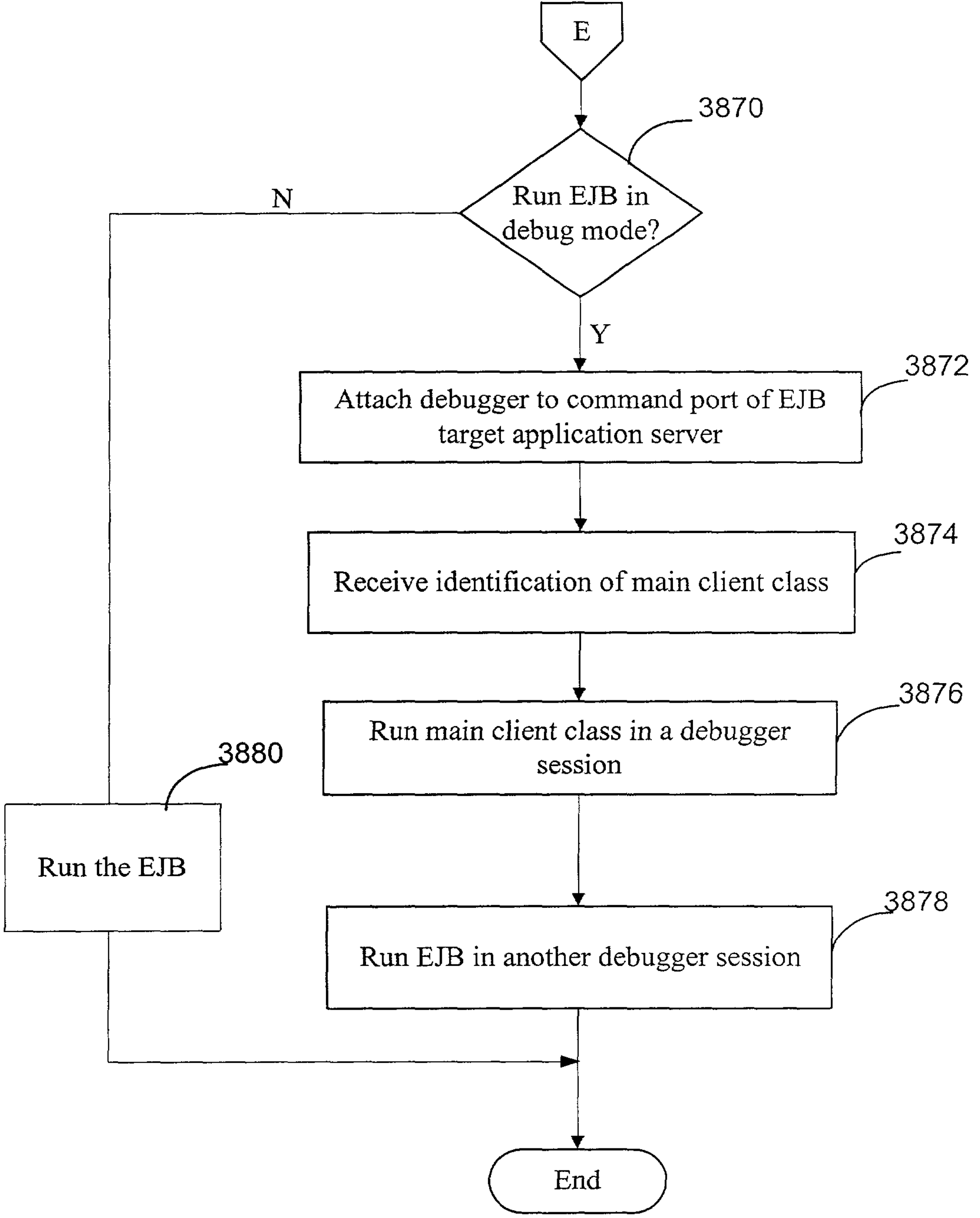
09839645.042001

FIG. 38E


D
3860
Deploy EJB in deployment archive to EJB target application server
3864
Provide the browser on client with hyperlink to test create method in EJB
3866
Provide the browser on client with hyperlink to test business method in EJB
3868
Provide the browser with an operation call result page to receive a response from the invoked business method
E

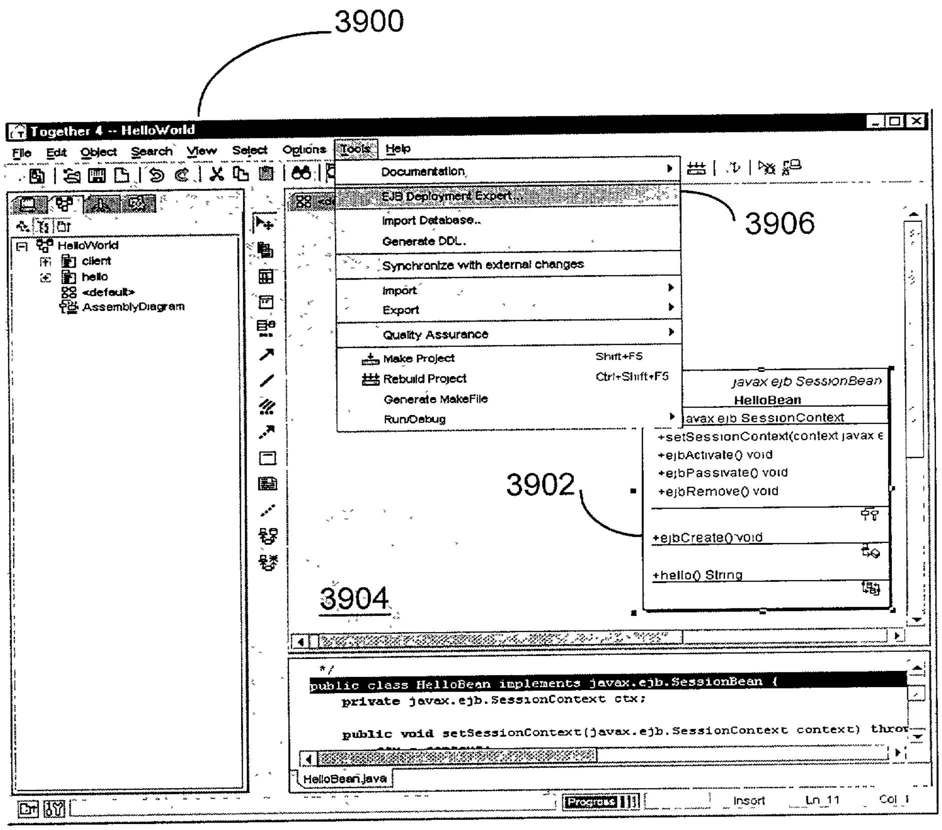
09839646.042001

FIG. 38F


E
3870
Run EJB in debug mode?
N
Y
3872
Attach debugger to command port of EJB target application server
3874
Receive identification of main client class
3876
Run main client class in a debugger session
3878
Run EJB in another debugger session
3880
Run the EJB
End

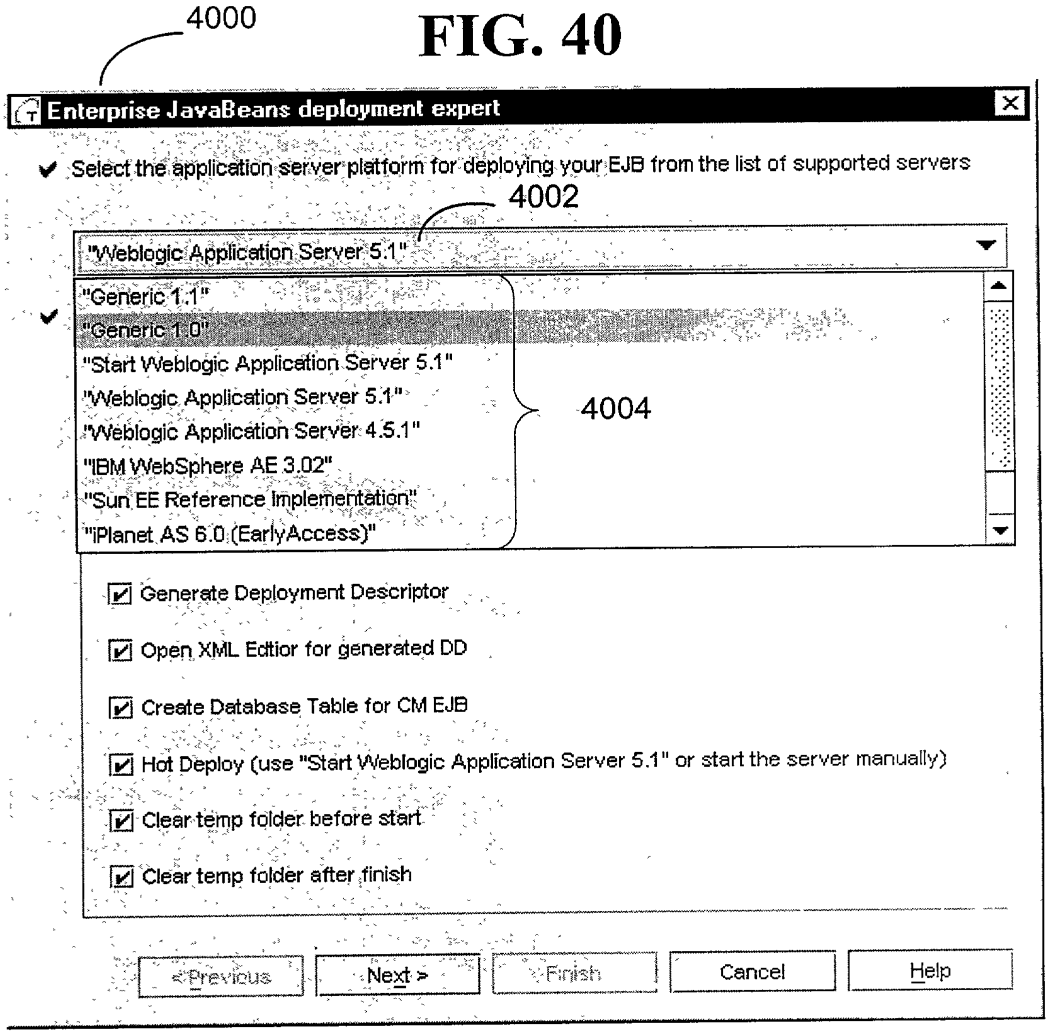
10024063 "94565260"

FIG. 39


3900
Together 4 -- HelloWorld
File Edit Object Search View Select Options Tools Help
Documentation
EJB Deployment Expert...
Import Database...
Generate DDL...
Synchronize with external changes
Import
Export
Quality Assurance
Make Project Shift+F5
Rebuild Project Ctrl+Shift+F5
Generate MakeFile
Run/Debug
3906
HelloWorld
client
hello
<default>
AssemblyDiagram
javax ejb SessionBean
HelloBean
javax ejb SessionContext
+setSessionContext(context javax e
+ejbActivate() void
+ejbPassivate() void
+ejbRemove() void
+ejbCreate() void
+hello() String
3902
3904
HelloBean.java
Progress
Insert
Ln 11
Col 1

```
  */
public class HelloBean implements javax.ejb.SessionBean {
    private javax.ejb.SessionContext ctx;

    public void setSessionContext(javax.ejb.SessionContext context) thro
```

FIG. 40



Enterprise JavaBeans deployment expert

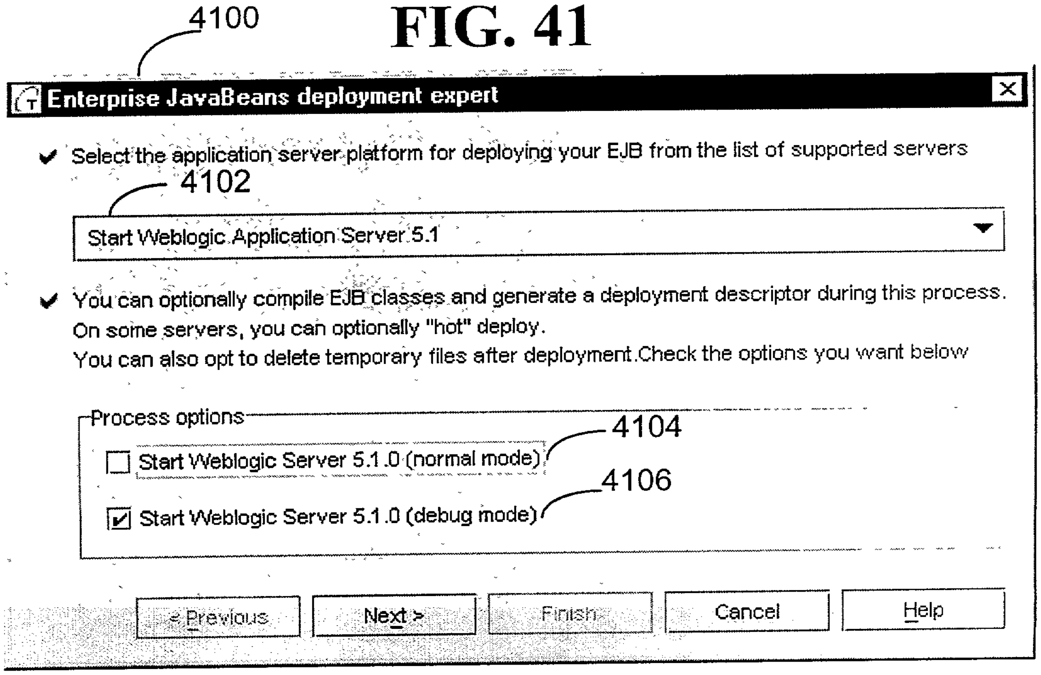
✓ Select the application server platform for deploying your EJB from the list of supported servers

"Weblogic Application Server 5.1"

- "Generic 1.1"
- "Generic 1.0"
- "Start Weblogic Application Server 5.1"
- "Weblogic Application Server 5.1"
- "Weblogic Application Server 4.5.1"
- "IBM WebSphere AE 3.02"
- "Sun EE Reference Implementation"
- "iPlanet AS 6.0 (EarlyAccess)"

☑ Generate Deployment Descriptor
☑ Open XML Edtior for generated DD
☑ Create Database Table for CM EJB
☑ Hot Deploy (use "Start Weblogic Application Server 5.1" or start the server manually)
☑ Clear temp folder before start
☑ Clear temp folder after finish

FIG. 41



Enterprise JavaBeans deployment expert

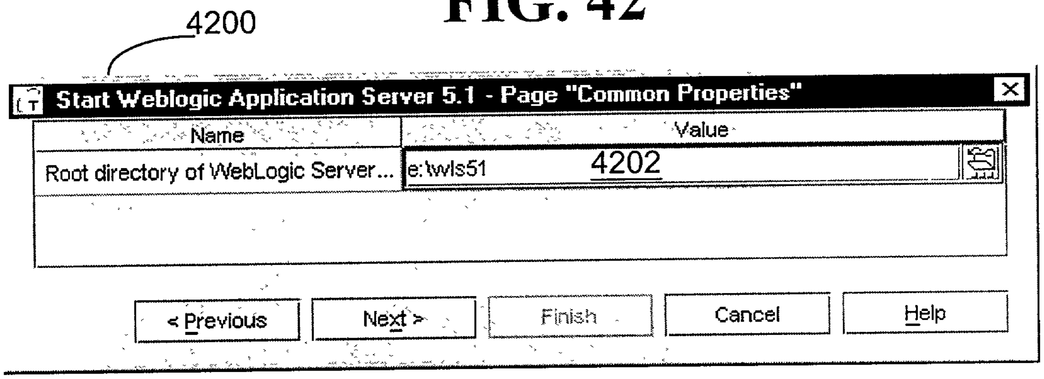
✓ Select the application server platform for deploying your EJB from the list of supported servers

Start Weblogic Application Server 5.1

✓ You can optionally compile EJB classes and generate a deployment descriptor during this process.
On some servers, you can optionally "hot" deploy.
You can also opt to delete temporary files after deployment.Check the options you want below

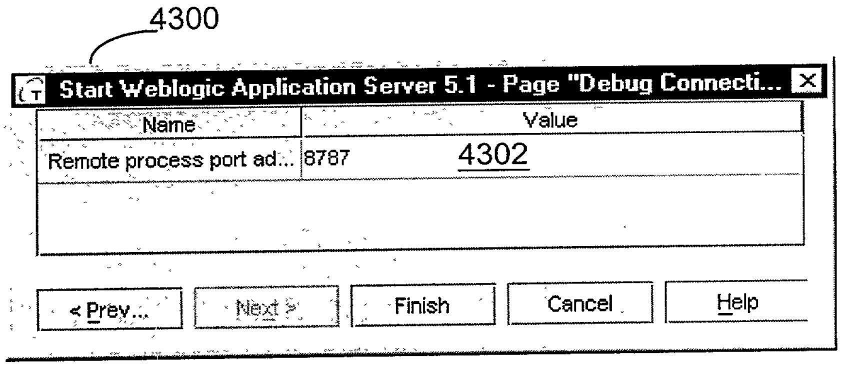
Process options
☐ Start Weblogic Server 5.1.0 (normal mode)
☑ Start Weblogic Server 5.1.0 (debug mode)

FIG. 42


4200
Start Weblogic Application Server 5.1 - Page "Common Properties"
4202
< Previous
Next >
Finish
Cancel
Help

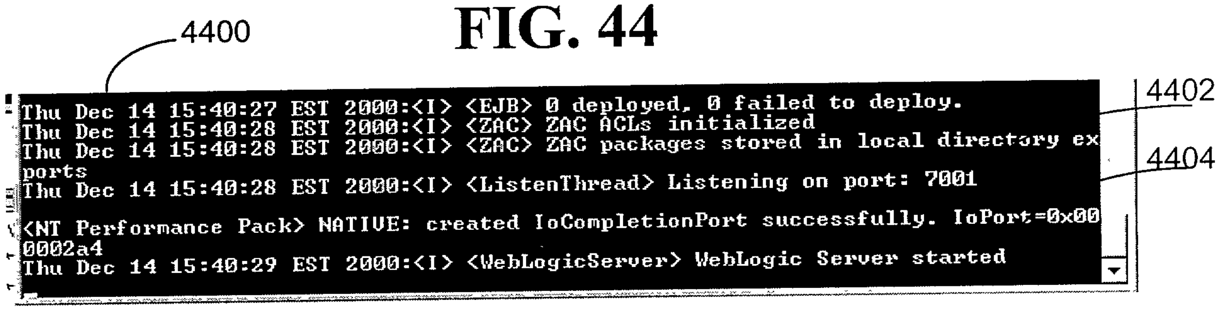
Name	Value
Root directory of WebLogic Server...	e:\wls51

FIG. 43


4300
Start Weblogic Application Server 5.1 - Page "Debug Connecti...
4302
< Prev...
Next >
Finish
Cancel
Help

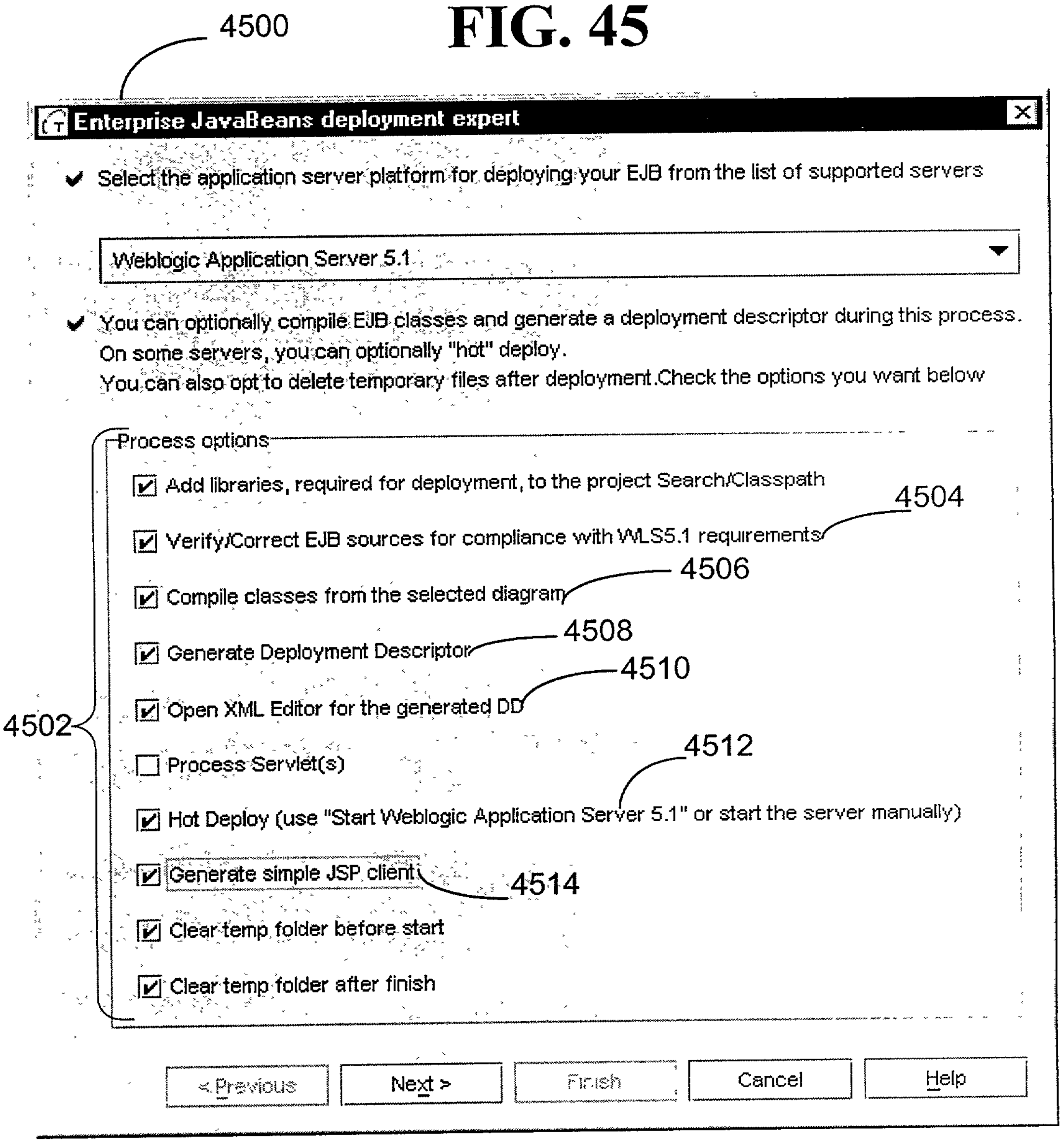
Name	Value
Remote process port ad...	8787

FIG. 44


4400
4402
4404

```
Thu Dec 14 15:40:27 EST 2000:<I> <EJB> 0 deployed, 0 failed to deploy.
Thu Dec 14 15:40:28 EST 2000:<I> <ZAC> ZAC ACLs initialized
Thu Dec 14 15:40:28 EST 2000:<I> <ZAC> ZAC packages stored in local directory ex
ports
Thu Dec 14 15:40:28 EST 2000:<I> <ListenThread> Listening on port: 7001

<NT Performance Pack> NATIVE: created IoCompletionPort successfully. IoPort=0x00
0002a4
Thu Dec 14 15:40:29 EST 2000:<I> <WebLogicServer> WebLogic Server started
```

FIG. 45



Enterprise JavaBeans deployment expert

✔ Select the application server platform for deploying your EJB from the list of supported servers

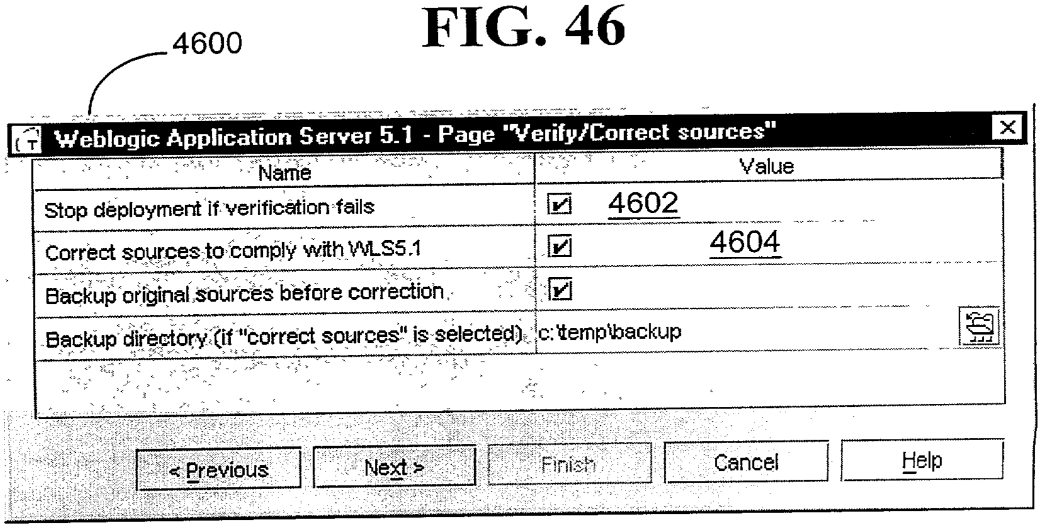
Weblogic Application Server 5.1 ▼

✔ You can optionally compile EJB classes and generate a deployment descriptor during this process.
On some servers, you can optionally "hot" deploy.
You can also opt to delete temporary files after deployment.Check the options you want below

Process options

- ☑ Add libraries, required for deployment, to the project Search/Classpath
- ☑ Verify/Correct EJB sources for compliance with WLS5.1 requirements
- ☑ Compile classes from the selected diagram
- ☑ Generate Deployment Descriptor
- ☑ Open XML Editor for the generated DD
- ☐ Process Servlet(s)
- ☑ Hot Deploy (use "Start Weblogic Application Server 5.1" or start the server manually)
- ☑ Generate simple JSP client
- ☑ Clear temp folder before start
- ☑ Clear temp folder after finish

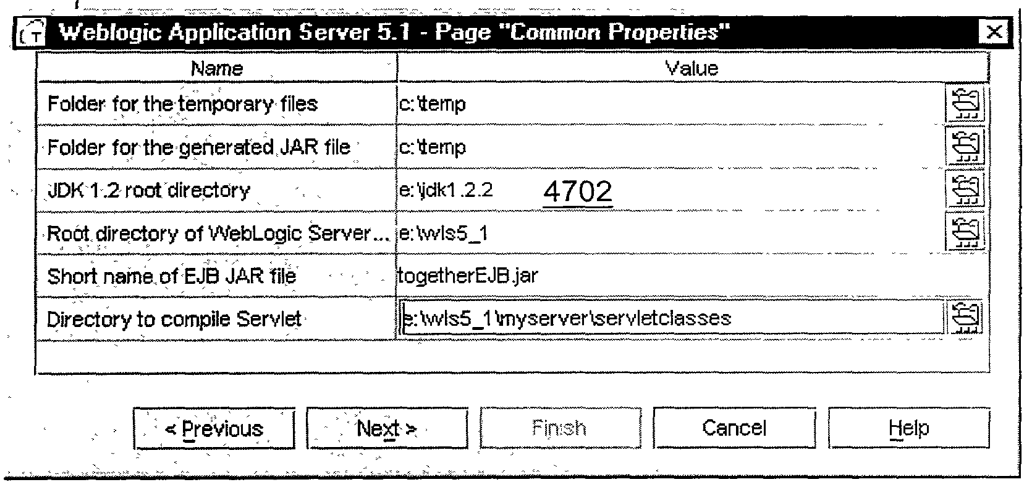
FIG. 46



Weblogic Application Server 5.1 - Page "Verify/Correct sources"

Name	Value
Stop deployment if verification fails	☑
Correct sources to comply with WLS5.1	☑
Backup original sources before correction	☑
Backup directory (if "correct sources" is selected)	c:\temp\backup

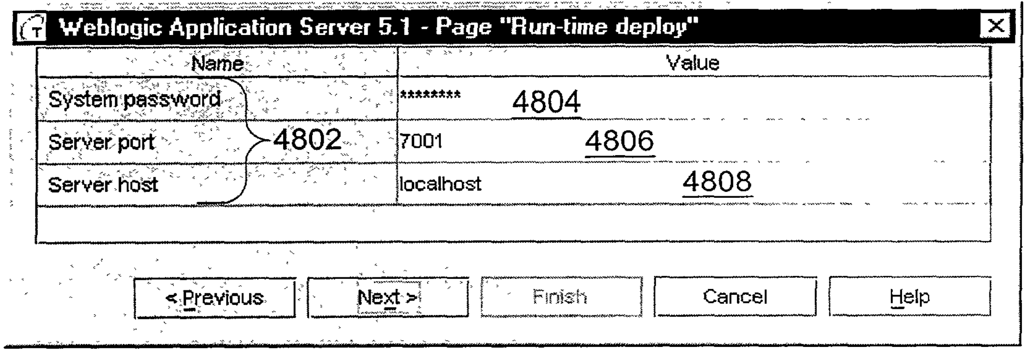
FIG. 47


4700
4702
< Previous
Next >
Finish
Cancel
Help

Weblogic Application Server 5.1 - Page "Common Properties"

Name	Value
Folder for the temporary files	c:\temp
Folder for the generated JAR file	c:\temp
JDK 1.2 root directory	e:\jdk1.2.2
Root directory of WebLogic Server...	e:\wls5_1
Short name of EJB JAR file	togetherEJB.jar
Directory to compile Servlet	e:\wls5_1\myserver\servletclasses

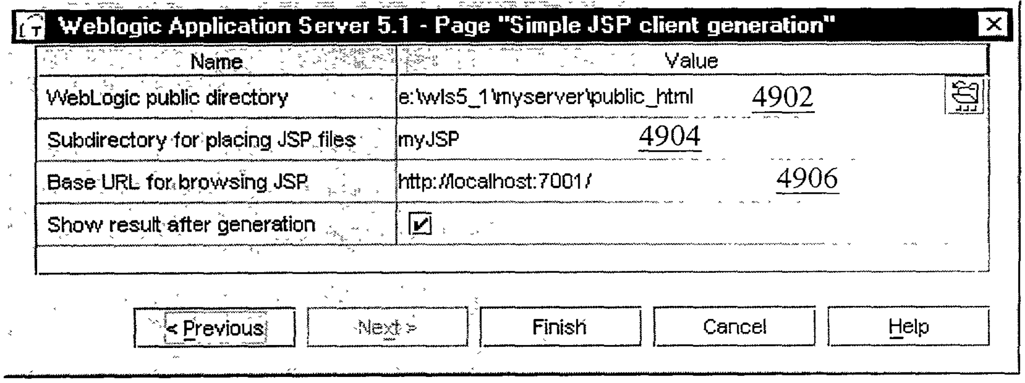
FIG. 48


4800
4802
4804
4806
4808
< Previous
Next >
Finish
Cancel
Help

Weblogic Application Server 5.1 - Page "Run-time deploy"

Name	Value
System password	********
Server port	7001
Server host	localhost

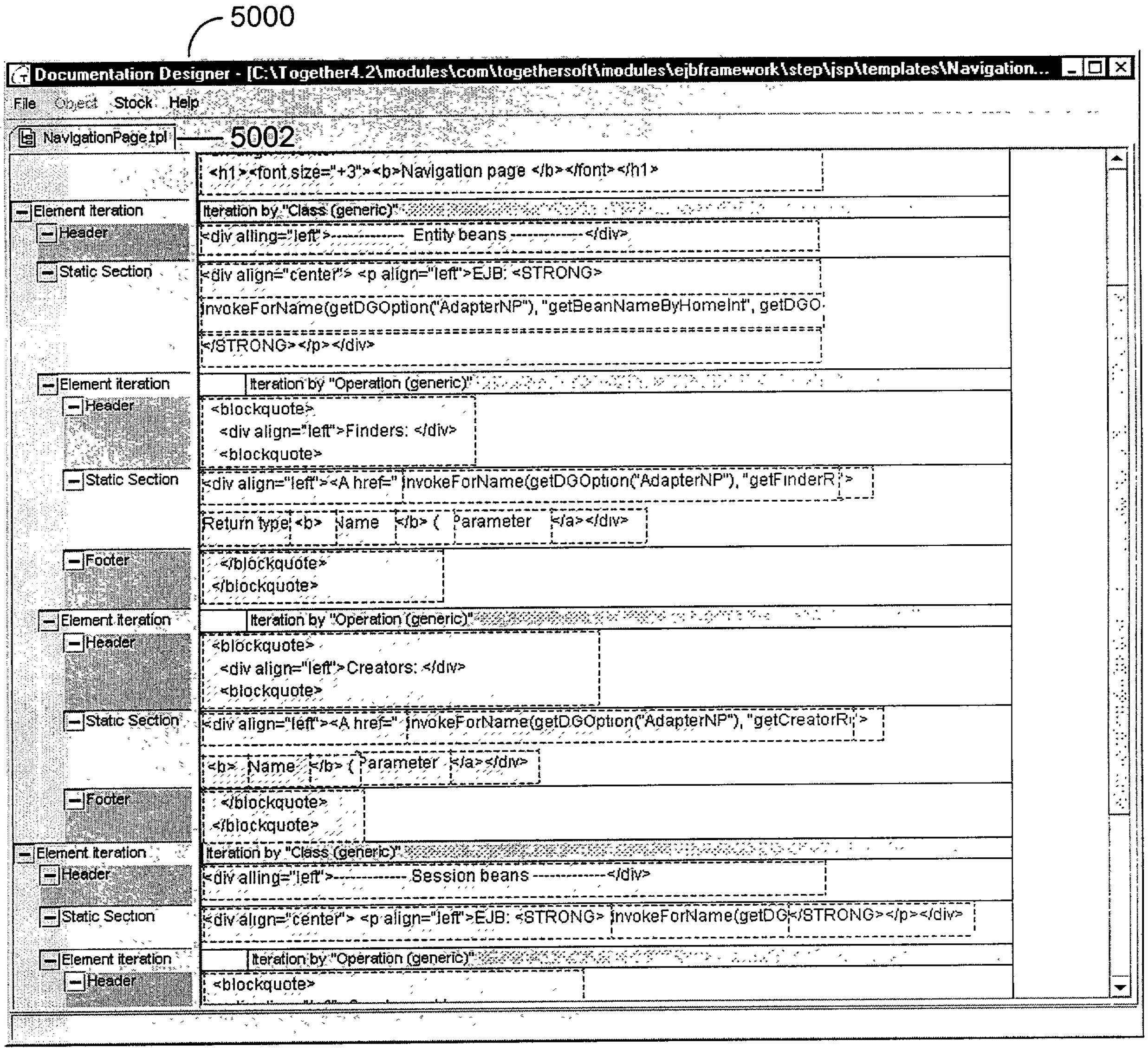
FIG. 49


4900
4902
4904
4906
< Previous
Next >
Finish
Cancel
Help

Weblogic Application Server 5.1 - Page "Simple JSP client generation"

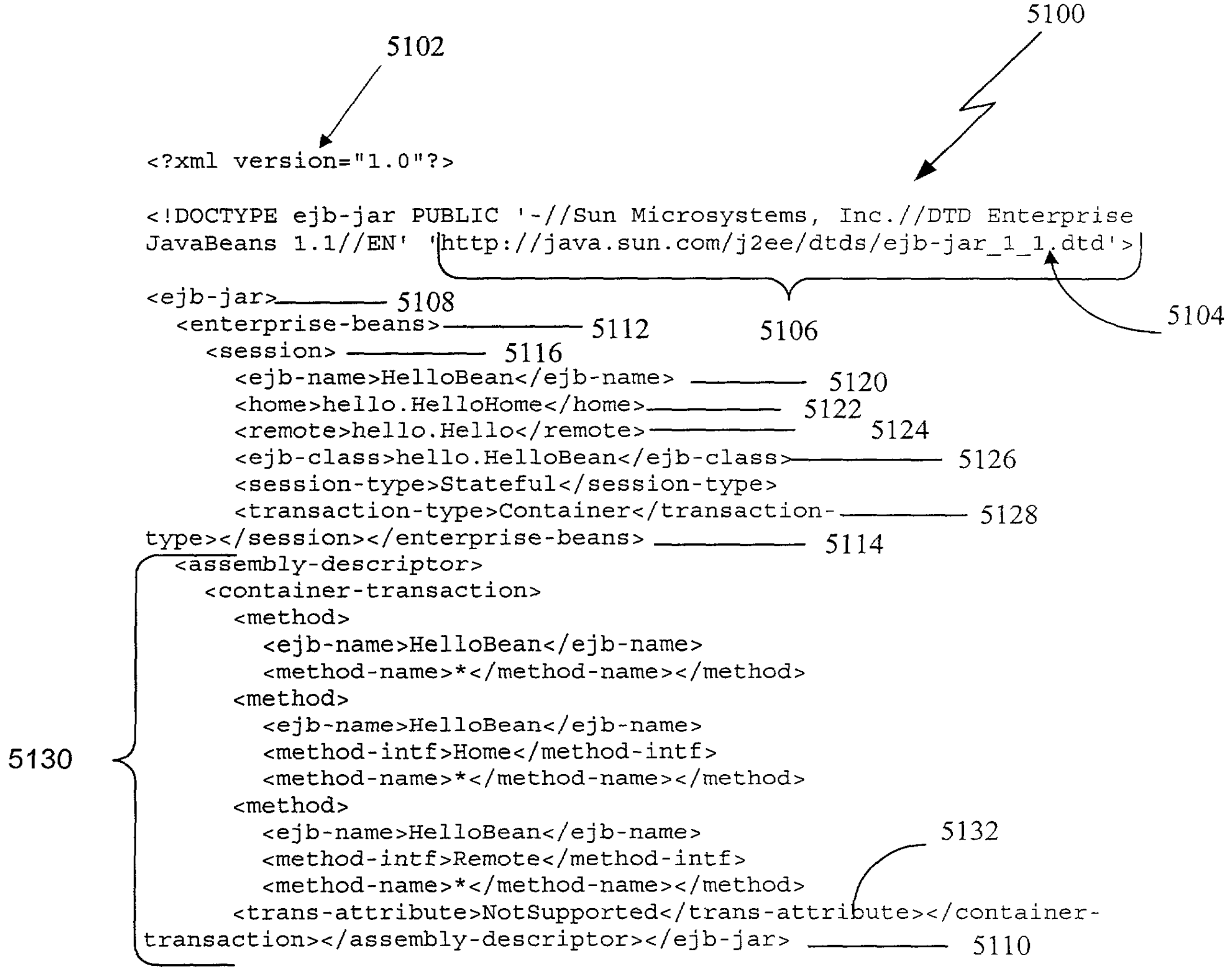
Name	Value
WebLogic public directory	e:\wls5_1\myserver\public_html
Subdirectory for placing JSP files	myJSP
Base URL for browsing JSP	http://localhost:7001/
Show result after generation	☑

FIG. 50


5000
Documentation Designer - [C:\Together4.2\modules\com\togethersoft\modules\ejbframework\step\jsp\templates\Navigation...
File
Object
Stock
Help
NavigationPage.tpl
5002
Element iteration
Header
Static Section
Element iteration
Header
Static Section
Footer
Element iteration
Header
Static Section
Footer
Element iteration
Header
Static Section
Element iteration
Header

```
<h1><font size="+3"><b>Navigation page </b></font></h1>
Iteration by "Class (generic)"
<div alling="left">------------ Entity beans ------------</div>
<div align="center"> <p align="left">EJB: <STRONG>
invokeForName(getDGOption("AdapterNP"), "getBeanNameByHomeInt", getDGO
</STRONG></p></div>
Iteration by "Operation (generic)"
<blockquote>
  <div align="left">Finders: </div>
  <blockquote>
<div align="left"><A href=" invokeForName(getDGOption("AdapterNP"), "getFinderR ">
Return type <b> Name </b> ( Parameter </a></div>
  </blockquote>
</blockquote>
Iteration by "Operation (generic)"
<blockquote>
  <div align="left">Creators: </div>
  <blockquote>
<div align="left"><A href=" invokeForName(getDGOption("AdapterNP"), "getCreatorR ">
<b> Name </b> ( Parameter </a></div>
  </blockquote>
</blockquote>
Iteration by "Class (generic)"
<div alling="left">------------ Session beans ------------</div>
<div align="center"> <p align="left">EJB: <STRONG> invokeForName(getDG </STRONG></p></div>
Iteration by "Operation (generic)"
<blockquote>
```

FIG. 51

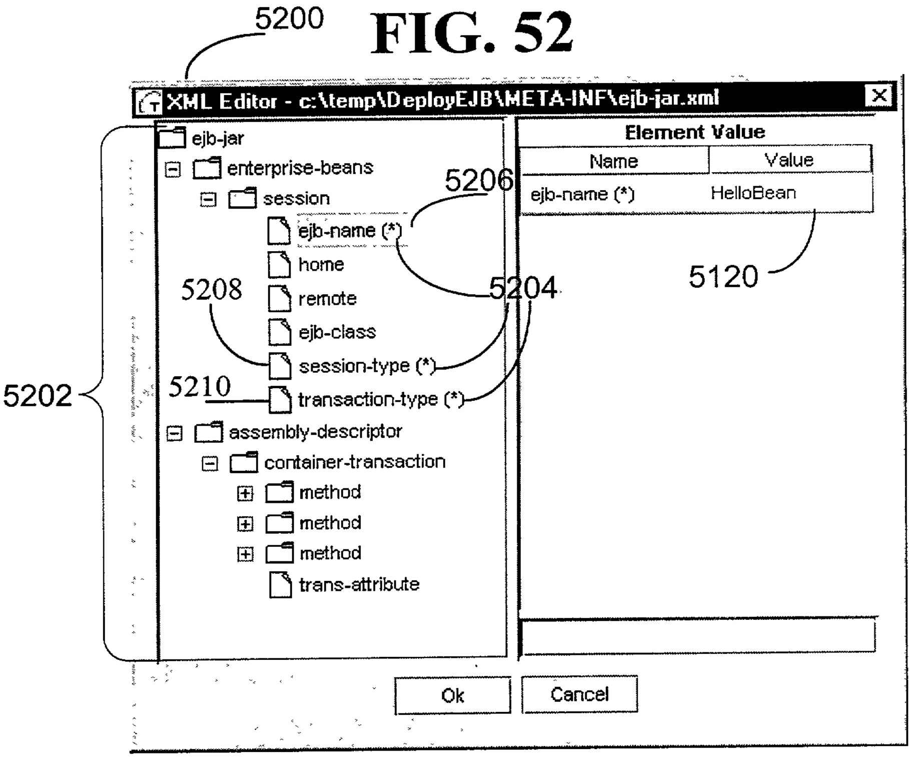


```
<?xml version="1.0"?>

<!DOCTYPE ejb-jar PUBLIC '-//Sun Microsystems, Inc.//DTD Enterprise
JavaBeans 1.1//EN' 'http://java.sun.com/j2ee/dtds/ejb-jar_1_1.dtd'>

<ejb-jar>
  <enterprise-beans>
    <session>
      <ejb-name>HelloBean</ejb-name>
      <home>hello.HelloHome</home>
      <remote>hello.Hello</remote>
      <ejb-class>hello.HelloBean</ejb-class>
      <session-type>Stateful</session-type>
      <transaction-type>Container</transaction-
type></session></enterprise-beans>
  <assembly-descriptor>
    <container-transaction>
      <method>
        <ejb-name>HelloBean</ejb-name>
        <method-name>*</method-name></method>
      <method>
        <ejb-name>HelloBean</ejb-name>
        <method-intf>Home</method-intf>
        <method-name>*</method-name></method>
      <method>
        <ejb-name>HelloBean</ejb-name>
        <method-intf>Remote</method-intf>
        <method-name>*</method-name></method>
      <trans-attribute>NotSupported</trans-attribute></container-
transaction></assembly-descriptor></ejb-jar>
```

5100
5102
5104
5106
5108
5112
5116
5120
5122
5124
5126
5128
5114
5130
5132
5110

100240.34553560

FIG. 52


5200
5202
5206
5204
5208
5210
5120
Ok
Cancel

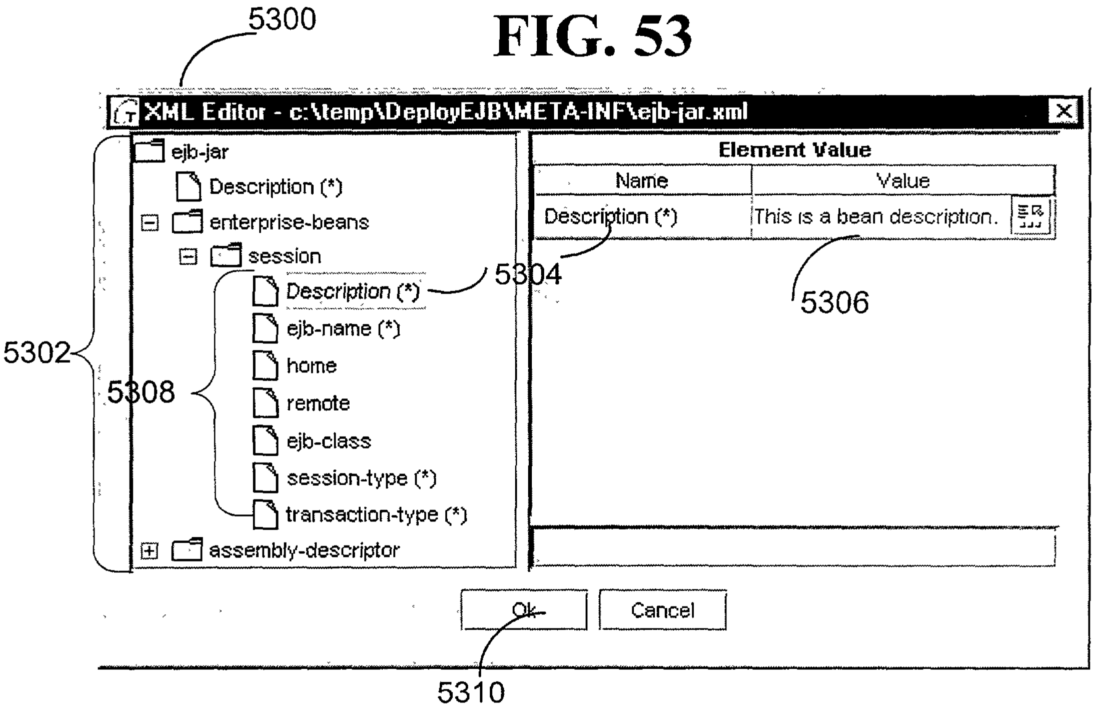
XML Editor - c:\temp\DeployEJB\META-INF\ejb-jar.xml

- ejb-jar
  - enterprise-beans
    - session
      - ejb-name (*)
      - home
      - remote
      - ejb-class
      - session-type (*)
      - transaction-type (*)
  - assembly-descriptor
    - container-transaction
      - method
      - method
      - method
      - trans-attribute

Element Value

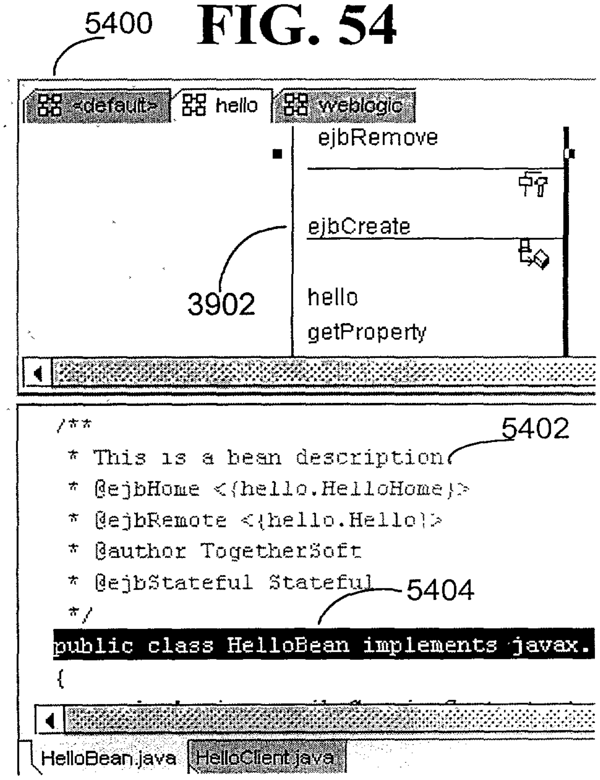
Name	Value
ejb-name (*)	HelloBean

FIG. 53


5300
XML Editor - c:\temp\DeployEJB\META-INF\ejb-jar.xml
ejb-jar
Description (*)
enterprise-beans
session
Description (*)
ejb-name (*)
home
remote
ejb-class
session-type (*)
transaction-type (*)
assembly-descriptor
Element Value
Ok
Cancel
5302
5304
5306
5308
5310

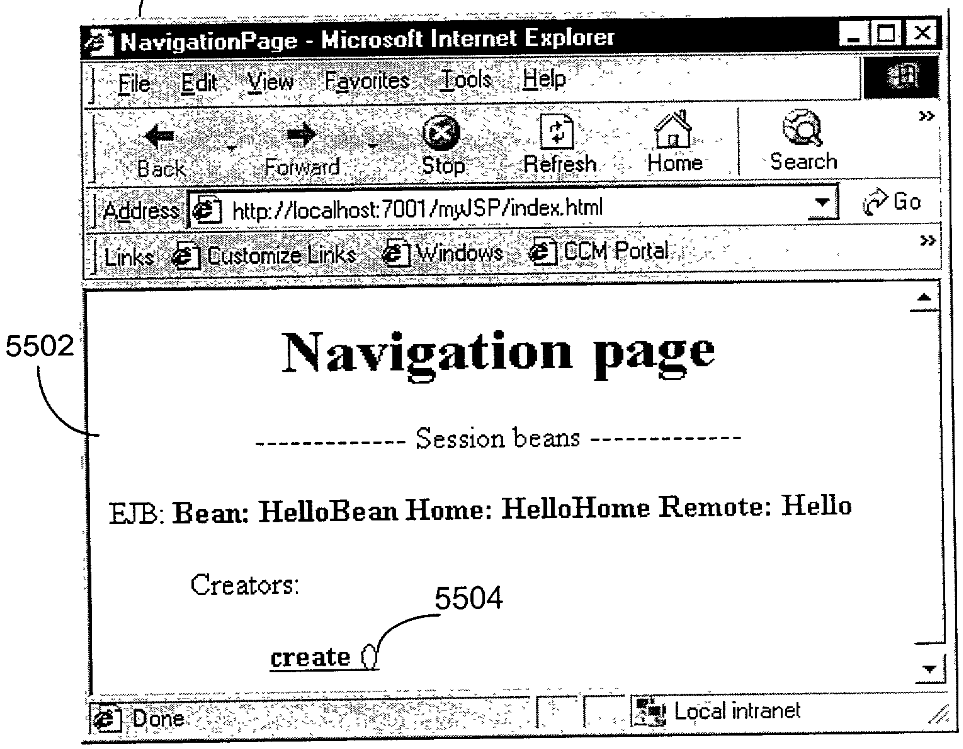
Name	Value
Description (*)	This is a bean description.

FIG. 54


5400
<default>
hello
weblogic
ejbRemove
ejbCreate
hello
getProperty
3902
5402
5404
HelloBean.java
HelloClient.java

```
/**
 * This is a bean description.
 * @ejbHome <{hello.HelloHome}>
 * @ejbRemote <{hello.Hello}>
 * @author TogetherSoft
 * @ejbStateful Stateful
 */
public class HelloBean implements javax.
{
```

FIG. 55


5500
NavigationPage - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search
Address http://localhost:7001/myJSP/index.html
Go
Links Customize Links Windows CCM Portal
5502
5504
Done
Local intranet

Navigation page

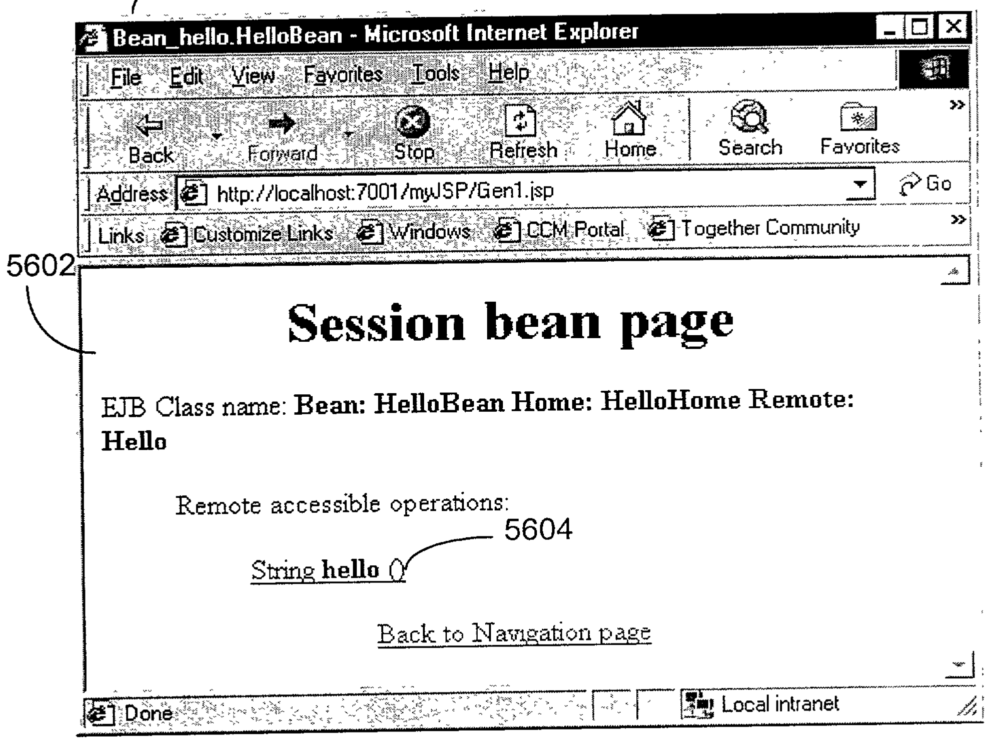
------------- Session beans -------------

EJB: **Bean: HelloBean Home: HelloHome Remote: Hello**

Creators:

create ()

FIG. 56


5600
Bean_hello.HelloBean - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites
Address http://localhost:7001/myJSP/Gen1.jsp
Go
Links Customize Links Windows CCM Portal Together Community
5602
5604
Done
Local intranet

Session bean page

EJB Class name: **Bean: HelloBean Home: HelloHome Remote: Hello**

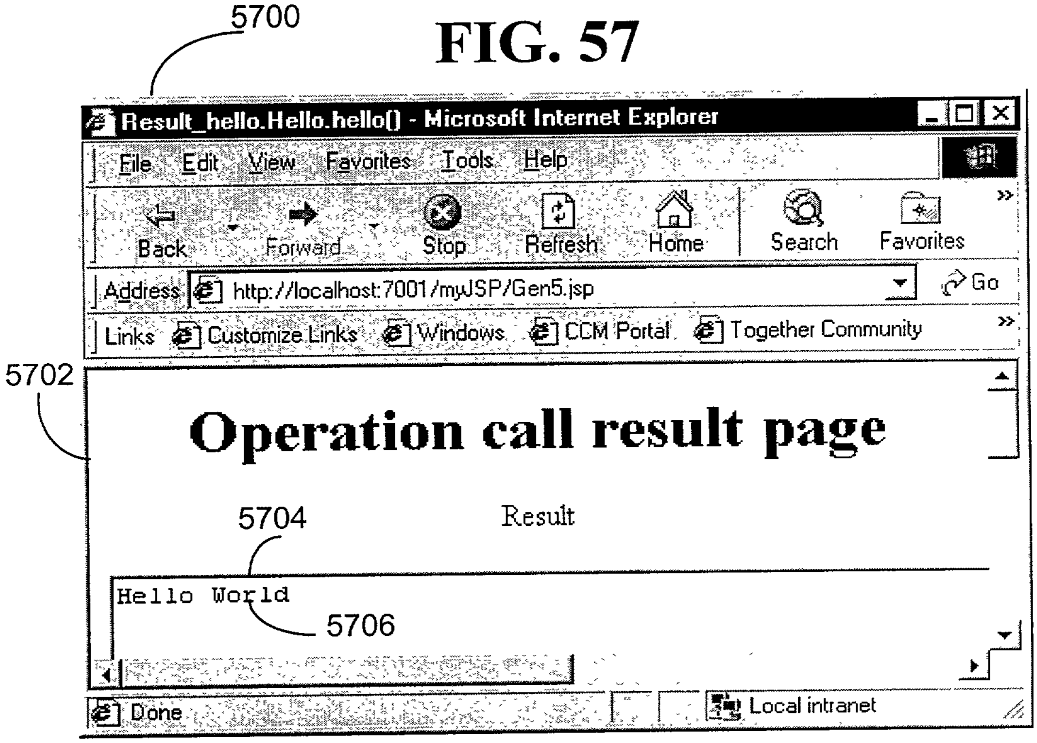
Remote accessible operations:

String **hello ()**

Back to Navigation page

09835465 . 042401

FIG. 57


5700
Result_hello.Hello.hello() - Microsoft Internet Explorer
File
Edit
View
Favorites
Tools
Help
Back
Forward
Stop
Refresh
Home
Search
Favorites
Address
Go
Links
Customize Links
Windows
CCM Portal
Together Community
5702
5704
5706
Done
Local intranet

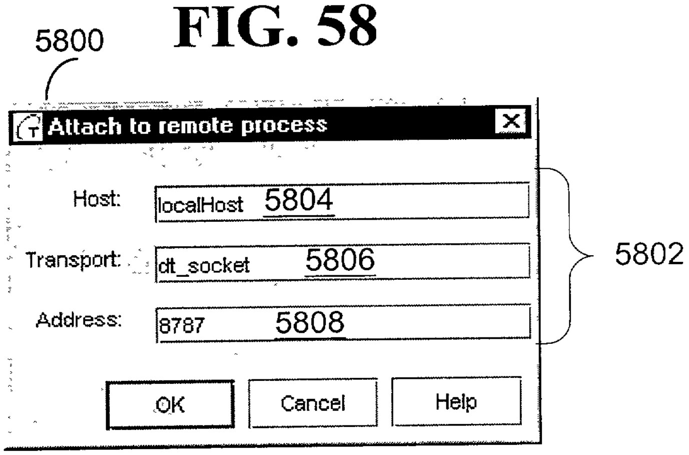
http://localhost:7001/myJSP/Gen5.jsp

Operation call result page

Result

```
Hello World
```

FIG. 58

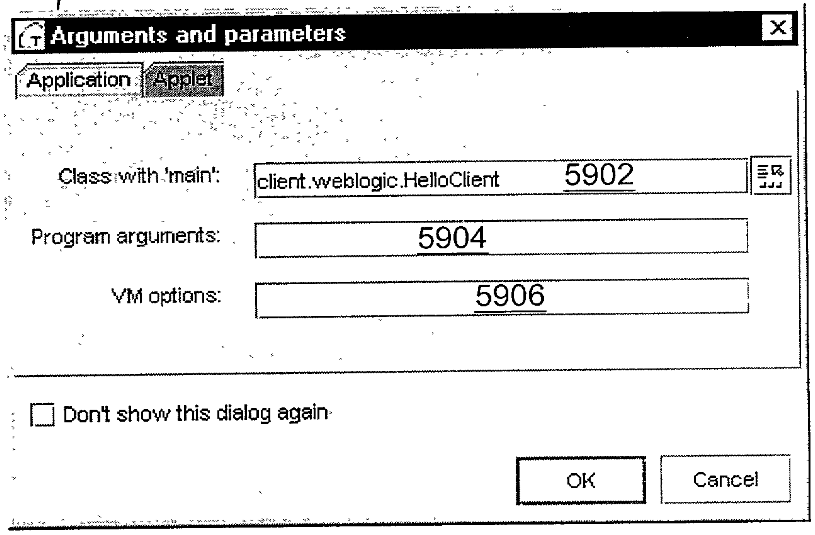

5800
Attach to remote process
5804
5806
5808
5802
OK
Cancel
Help

Host: localHost

Transport: dt_socket

Address: 8787

FIG. 59


5900
Arguments and parameters
Application
Applet
5902
5904
5906
OK
Cancel

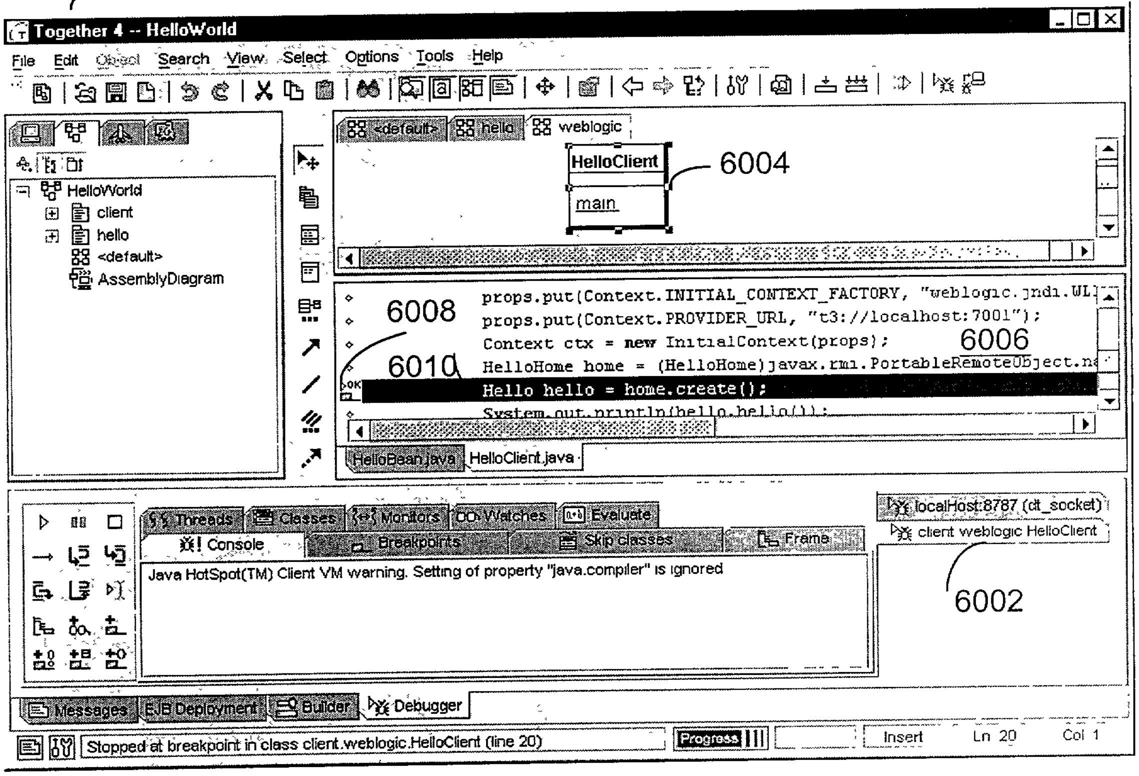
Class with 'main': client.weblogic.HelloClient

Program arguments:

VM options:

☐ Don't show this dialog again

FIG. 60

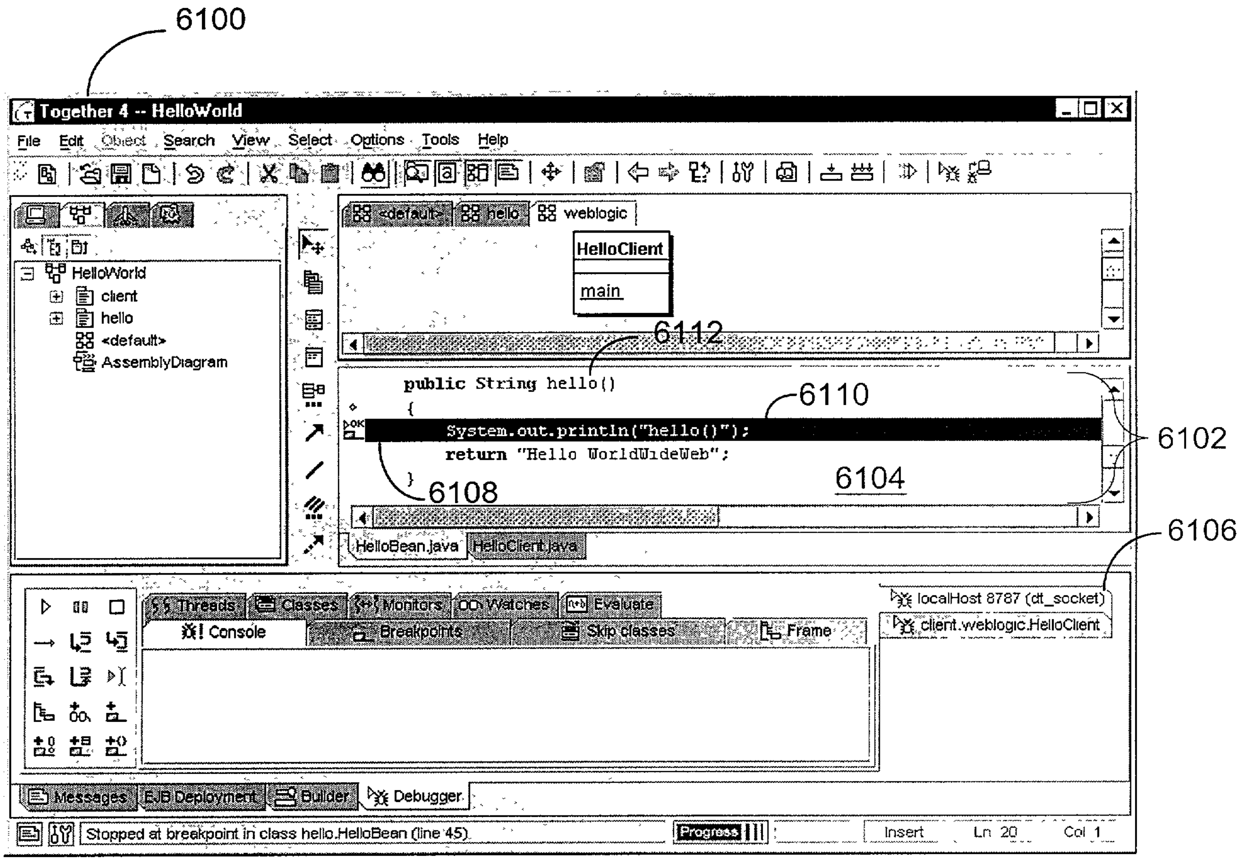

6000
Together 4 -- HelloWorld
File
Edit
Object
Search
View
Select
Options
Tools
Help
HelloWorld
client
hello
<default>
AssemblyDiagram
<default>
hello
weblogic
HelloClient
main
6004
6008
6010
6006
HelloBean.java
HelloClient.java
Threads
Classes
Monitors
Watches
Evaluate
Console
Breakpoints
Skip classes
Frame
localHost:8787 (dt_socket)
client.weblogic.HelloClient
6002
Messages
EJB Deployment
Builder
Debugger
Progress
Insert
Ln 20
Col 1

```
props.put(Context.INITIAL_CONTEXT_FACTORY, "weblogic.jndi.WL
props.put(Context.PROVIDER_URL, "t3://localhost:7001");
Context ctx = new InitialContext(props);
HelloHome home = (HelloHome)javax.rmi.PortableRemoteObject.na
Hello hello = home.create();
System.out.println(hello.hello());
```

```
Java HotSpot(TM) Client VM warning. Setting of property "java.compiler" is ignored
```

Stopped at breakpoint in class client.weblogic.HelloClient (line 20)

FIG. 61


6100
Together 4 -- HelloWorld
File
Edit
Object
Search
View
Select
Options
Tools
Help
HelloWorld
client
hello
<default>
AssemblyDiagram
<default>
hello
weblogic
HelloClient
main
6112
6110
6102
6104
6108
HelloBean.java
HelloClient.java
6106
Threads
Classes
Monitors
Watches
Evaluate
Console
Breakpoints
Skip classes
Frame
localHost 8787 (dt_socket)
client.weblogic.HelloClient
Messages
EJB Deployment
Builder
Debugger
Progress
Insert
Ln 20
Col 1

```
public String hello()
{
    System.out.println("hello()");
    return "Hello WorldWideWeb";
}
```

Stopped at breakpoint in class hello.HelloBean (line 45)